



THE WHICHPLM REPORT THE 3D ISSUE



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5TH EDITION

THE WHICHPLM REPORT THE 3D ISSUE

5TH EDITION

Welcome

to the WhichPLM Report: 5th Edition



WELCOME TO THE NEW WHICHPLM REPORT. THIS IS OUR FIFTH PUBLICATION, CHRONOLOGICALLY SPEAKING, BUT THE FIRST TO PREMIERE A BRAND NEW NAME, NEW FORMAT, AND NEW FEATURES DESIGNED TO TAKE OUR CORE PLM AND BROADER FASHION TECHNOLOGY ANALYSIS TO A NEW LEVEL.

I have been lucky enough to oversee the production of all five publications WhichPLM has issued, from our 2010 independent Customer Survey – the first of its kind anywhere in the apparel industry – to last year’s third Annual Review, which perfected the format first established in 2012, and became a primary reference source for educated brands, retailers and manufacturers around the world looking to make the most of their investments in technology.

Each of those publications was researched and written at a time of significant change in the PLM market for retail, footwear and apparel (RFA). WhichPLM itself was founded in 2008, and over the course of the last seven years, the team and I have charted the industry’s dramatic evolution online every week, and, since 2012, yearly in print.

Since the late 1980’s when a small pool of suppliers started offering comparatively simple specification management tools – named PDM (product data management) – to what has evolved through CPM

(collaborative product management), we have arrived at PLM. Today’s modern PLM has grown to become a buoyant market of dedicated vendors developing whole-enterprise, brand-critical solutions tailored for the increasingly diverse needs of retailers, brands and manufacturers on every continent.

Reviewing market performance and adoption during the last fiscal year (running from April 1st 2013 to March 31st 2014) we concluded that PLM for RFA had reached heights that exceeded even our most optimistic predictions. Exhibiting close to 20% year-on-year growth with considerable untapped potential for the future, we arrived at the bold conclusion that modern PLM had “crossed the chasm” and achieved broad market penetration.

The chasm (a concept originating with Geoffrey A. Moore) is a metaphor for the difficult transition that new technologies have to make from appealing to a small number of ideal customers, to having the scope, scale and staying power to reach the masses.

Different products overcome these growing pains in their own ways. In the case of PLM, the results quite literally spoke for themselves; a healthy mix of multinational retailers and small-to-medium brands achieved cost savings and efficiency optimisations through PLM that inspired others in their revenue brackets and regions to consider the challenges they had in common.

But if the approach to the chasm is characterised by competition and rapid iteration, then the far side – steady adoption and stronger, more predictable growth – exhibits a kind of slowing down. Market shifts and technological innovations still occur, but will typically be far less pronounced on an annual basis. Indeed, some aspects of the market will now seem to be completely static – a perfect example being our four years' worth of practically identical data demonstrating that customers choose their PLM partner on the strength of their fashion industry expertise.

So rather than commit to analysing on an annual basis forces that may only change noticeably over a longer period, we chose to take the best and most suitable parts of the Annual Review format (already refined over three iterations) and develop a new kind of publication – one that retains the core analytical focus of our Annual Reviews, but also reflects the broader enterprise potential of PLM and the huge variety of solutions that still need to be connected to it.

These solutions include everything from 2D CAD, knitting and weaving systems, to 3D design and virtual store planning solutions – all of which we were the first to group under the banner of extended-PLM or E-PLM. And in a market where mass adoption is nudging core PLM products towards feature parity, these extended solutions have become increasingly important, helping to contextualise and complement PLM's place in modern brand and retail operations.

Indeed, this year saw at least one multi-solution vendor proclaim that everything they offer (including CAD software, 3D design tools, patternmaking, and even manufacturing hardware) is now considered an integrated part of PLM, making them, in their words "a PLM company".

So strong is the potential for the right PLM solution, properly chosen, to integrate and enhance disconnected systems, that to talk about PLM today is to talk about all tools, resources, methods and people that make up the lifecycle of a product, from trend and inspiration right through to ongoing consumer engagement.

This new publication format is designed to better serve the new PLM community, and to provide a single point of reference for that wider interconnected conversation.

WhichPLM's new, numbered editions will therefore carry over the best of our core insight and analysis from previous publications, but each will also look in detail at a carefully-selected topic that we consider to be exerting the strongest influence on the future of extended product lifecycles across the RFA industry.

When it came to picking that topic for this fifth edition, there was very little discussion required; our only logical choice was the rapid advancement and adoption of three-dimensional (3D) workflows and tools.

Today, the unity of 3D tools and PLM is ready to transform the fashion industry to a far greater extent than most people realise. With rapid advancements in simulation fidelity, visual quality, user experience, and technical capability being demonstrated, these tools have already begun to change the way that garments, footwear, eyewear, accessories are designed, developed, manufactured and sold. It would not be an overstatement to say that no aspect of the modern, international product lifecycle will remain untouched once 3D crosses its own chasm – something I and many other industry figures believe will happen incredibly quickly.

Already, students are creating experimental collections in three dimensions, prototyping, sampling and altering on the fly. Huge corporations have invested heavily in perfecting cost-effective digital sublimation printing onto fabric, allowing even the wildest prints to leap from screen to fit model quickly and consistently. Fine timepieces, with a myriad moving parts, are being carefully grown from concept sketches to full-fledged, fully operational products, all in 3D. Everything from buttons and buckles to bracelets and experimental footwear designs are being printed directly from 3D CAD files using low-cost additive manufacturing techniques. Products and collections are being marketed online before their physical counterparts even exist, and entire handbag and footwear photoshoots are being conducted virtually, with colourways, materials, eyelets, furniture and other components all changeable with a click.

None of this is predictive; every story I listed above (and many more besides) is real. Without a shadow of a doubt, 3D has arrived, and it's already in use from head to toe – hats to high heels – within the walls of the world's biggest brands.

This publication, then, tells two stories: the story of PLM's continued spread into the mass market, and the geographical, economic and social influences shaping its future; and the story of 3D, no longer a gimmick, but an advanced technology and a digital-first mindset that's changing the way brands, retailers and manufacturers around the world do business.

Over the next 140+ pages, you will find:

- Editorial features, all exclusive to this report, and written by a fantastic team of editorial board members and external contributors. We have six features dedicated to 3D, and a further four covering core PLM topics.
- The results of our fifth PLM end user survey, now streamlined, and including brand new intelligence on the adoption and integration of 3D working.
- Vendor listings for core PLM, presenting the key technology vendors who most often appear on customer shortlists.
- Vendor listings for providers of 3D tools, allowing brands and retailers to make informed selections from this new but rapidly-growing marketplace.
- Listings of advisors and consultants, providing insights into the methods and experience of the selection and implementation consultants who work most frequently with brands and retailers looking to get the best out of PLM.
- Market analysis, continuing our tradition of presenting key market and investment data, and drawing conclusions on the global and regional performance of PLM. In this report, we have also added executive summaries and recommendations tailored for vendors, customers and advisors.
- The future of PLM – our running commentary on what our panel of international experts see as the biggest influences shaping the direction and development of PLM over the next calendar year and beyond.

All of the contents of this report are close to my heart, so this year I found it extremely difficult to pick favourites! My personal highlights are just that – personal – and I would advise you to read everything, cover to cover, in order to truly understand the potential of extended PLM to truly support the enterprises of tomorrow.

I'm incredibly proud of the editorial team that have worked to put together what I strongly believe to be, yet again, the best and most comprehensive picture available of the true nature of modern, extended product lifecycle management for fashion.

Mark Harrop

MARK HARROP
Founder & CEO

CEO's Picks

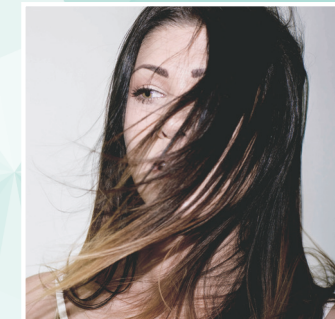
THESE PERSONAL HIGHLIGHTS ARE JUST A SMALL SELECTION OF THE EXCLUSIVE, EXPERT CONTENT CONTAINED THROUGHOUT THIS PUBLICATION.



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3D WORKING



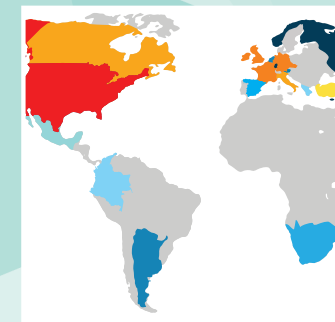
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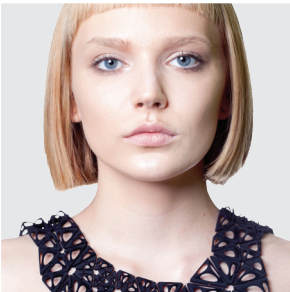
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3D PRINTING

3D. In Fashion.

FOR MANY INDUSTRIES, THREE-DIMENSIONAL WORKING IS NOTHING NEW. COMPUTER AIDED DESIGN TOOLS (IN BOTH 3D AND 2D VARIANTS) ARE FUNDAMENTALLY IMPORTANT TO INDUSTRIES AS SEEMINGLY DISCONNECTED AS SHIPBUILDING, MEDICINE, AND HOLLYWOOD POST-PRODUCTION.

And with landmark solutions like AutoCAD and Pro/Engineer both having been released in the 1980s, computerised two and three-dimensional product design and visualisation have now been commercial realities for more than thirty years.

But while automotive, engineering, consumer electronics and a host of other product-led sectors have all embraced the transition to computer-aided working – which offered considerable benefits over manual drafting and calculation – the fashion industry was, until recently, reticent to switch to a 3D workflow for a number of reasons.

The most obvious of these were the available tools' limitations in manipulating and simulating soft materials. While 3D CAD systems have long been capable of managing solids and surfaces for more rigid materials (accounting for their earlier adoption by handbag and footwear designers), it took the relatively recent additions of shaders, light-scattering techniques, and complex fabric simulations to create similarly viable results for apparel.

By 2015, however, pioneering developers have begun to market intuitive 3D solutions that meet – and often exceed – the exacting expectations of retail, footwear and apparel industry professionals in the areas of design, prototyping, sampling, store planning, marketing, and even (through the bleeding edge technology of 3D printing) manufacturing.

As the first WhichPLM publication with a special focus, our team were faced with a choice of which topic to cover in the Report you hold in your hands. It proved to be the easiest choice we have made; 3D working has seen rapid adoption in the mainstream retail, footwear and apparel market this year, spurred on by advances in both underlying technology and the user experience.

The following editorial features examine the shape this adoption has taken in greater detail, but broadly speaking WhichPLM believes that the primary value of

3D working lies in the virtual garment, shoe, or accessory's proximity to the real thing. The adage that a picture is worth a thousand words holds true, and indeed that value is accentuated when that picture can be rotated, zoomed, annotated, and tweaked in real time without the need for instruction or interpretation.

The ongoing success of PLM (something the up-to-date market analysis in this publication supports) is attributable to modern solutions' abilities to both optimise existing processes, and to provide the foundations for new ones. Judged on the same terms, 3D working as a whole – encompassing design, prototyping, sampling, visualisation, store planning, marketing and manufacture – is already proving its worth. By bringing the end user closer to the end result, brands, retailers and even solo designers can achieve better fit, better quality, and better style, as well as unlocking greater creative potential.

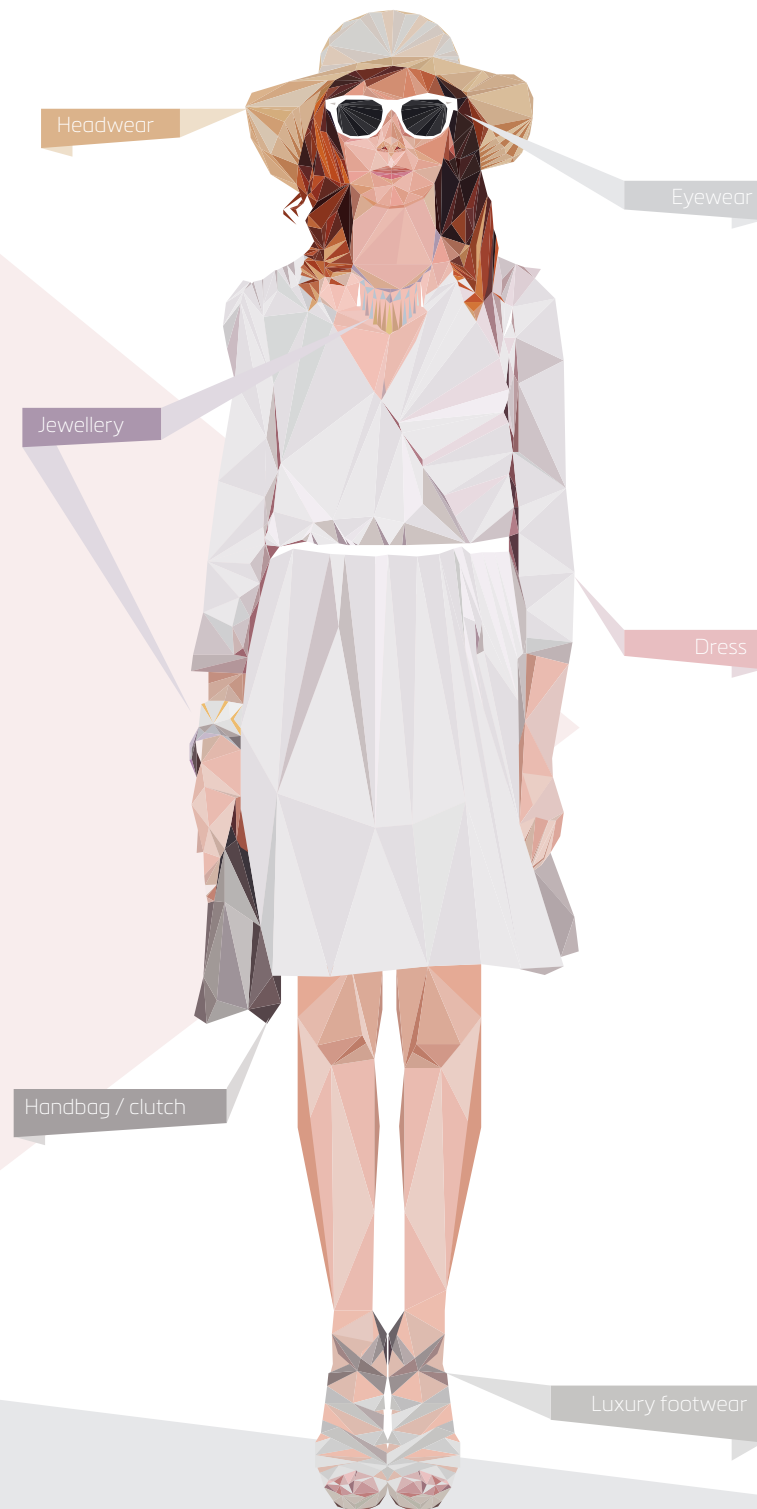
The illustrations on these pages may be abstract, but the potential for a full collection of products – outfitting shoppers head to toe – to be created, manufactured or marketed in 3D has already been realised.

Headwear, jewellery, footwear and eyewear can be designed in a 3D CAD solution, then printed using additive manufacturing, creating shapes and even functionality unattainable through traditional techniques. Consumer electronics and wearable technologies – including capacitive, touch-sensing fibres – can again be designed in 3D, while trousers, sweatshirts, dresses, outerwear and indeed the full range of apparel and intimates can be designed in 3D, prototyped using demographic-appropriate virtual avatars, sampled without costly logistics, and even trend-tested by consumers before they physically exist.

Although work is still underway to improve the behaviour of virtual fabrics, WhichPLM believes that 3D working can now support product development for fashion in three key areas: identity, fidelity and integrity.

And although most 3D solutions on the market support close integration to PLM, our analyst team considers 3D to be more than just another tool in the Swiss Army Knife of extended-PLM. But don't take our word for it: turn the page and begin hearing from software developers, designers, executives, brands and retailers how the transition to three dimensions is transforming their lives. ■

By bringing the end user closer to the end result, we can achieve better fit, better quality, and better style.





by
BEN HANSON

A New Dimension: FASHION'S TRANSITION TO 3D



Photo provided by Ron Carr, CoutureFashionWeek.com

Approach and ethics:

This editorial is the first in a series of five exclusives contained in these pages, all dedicated to the concept of three-dimensional working for retail, footwear and apparel. As the two pages prior to this feature (essential reading) explain, the purpose of this publication's special focus on 3D working is to discuss the potential of the solutions and platforms that exist to support it, and to present the opinions of the technology vendors, couture designers, multinational retailers and visionaries who are shaping its future.

As a long-time WhichPLM contributor (and former Editor) I asked to personally assemble three of these editorials because, in many ways, my own journey from 3D scepticism to 3D evangelism mirrors the way the industry itself has evolved - and certainly the way that retailers' and brands' attitudes to the technology have changed over time.

Alongside fellow contributors Kilara Le (an RFA business process expert) and Dwayne Catto (an experienced implementer of 3D at the executive level) I set out to tackle the subject head-on. I wanted to understand not just how 3D tools are being used in the industry in 2015, but how advancements to the technologies behind them are likely to drive increased adoption and emergent opportunities over the coming years.

Equally, I wanted to stay true to the stated goal of all WhichPLM's publications, online and off: providing and interpreting the information that allows the RFA industry to make better-informed investments in extended-PLM technology of all shapes and sizes.

With those aims, this first editorial focuses on 3D at the highest level. Over the course of spring and summer 2015, I sat down with the people developing it and the

people using it - some of whom you may recognise; some you may not - to better understand the role of 3D in a modern apparel enterprise, from sampling to store visualisation.

Reading this publication in order, this feature is followed by Kilara Le's examination of "The Rise of the Virtual Fashionista", after which I return with an analysis of the value that retailers, brands and manufacturers are actually obtaining from their investments in 3D in a feature titled "The ROI on 3D".

After that, Dwayne Catto writes about "Selling The Vision", based on his experience of 3D adoption at a prominent American brand. And then I return with an "Overview of 3D Printing", which talks about non-traditional manufacturing and the logical endpoint for the 3D asset in a variety of forms.

Following these features, this publication's attention returns to core PLM topics for the remainder of the editorial section (a further four features), although readers interested primarily in 3D will still find much to appreciate in those, with expert perspectives on what success means for disruptive technology, the modern face of corporate social responsibility, and the science of trend.

The 3D thread then continues in new and exclusive vendor listings, where many of the suppliers interviewed in these features present further opinions on their organisation's role in the industry's transition from two to three dimensional working.

Although vendors were invited to advertise on the pages opposite their profiles, readers are reminded that these features are not sponsored in any way, and neither my nor WhichPLM's opinions on the state of 3D for RFA is influenced in any way by commercial considerations.

“Today, I and the rest of the WhichPLM team consider 3D as the foremost technology capable of revolutionising the long-standard paradigms of design, development, manufacture and consumer engagement.”

3D and me

Working in fashion, it's reasonable to be a 3D sceptic.

Either because of practicality (you wonder how an industry so deeply rooted in physical products and two-dimensional sketching and patternmaking will ever change) or preconception (you've been exposed to early generations of 3D garments and found the results lacking) I won't blame you for doubting what 3D can do.

Because until a few years ago I doubted it myself.

The value of creating in 3D, communicating in 3D, marketing in 3D, and even manufacturing in 3D hasn't always been as readily apparent as it is now. In a move that's fairly typical of this industry, suppliers were too keen to exhibit their solutions before they were ready. And tied to that, a number of brands and retailers bought into the dream at a time when the products fell short in either usability or the quality of their output, and came away rather gun-shy as a result.

Part of the reason for this eagerness was the assumption that, like the automotive and aerospace industries before it, RFA would see the value in making the move to 3D right away. After all, humans see in three dimensions, and the products we create are designed to sit on three-dimensional bodies, so it stood to reason that creating 3D garments, footwear and accessories was the logical thing to do.

That assumption was correct, but it took longer than expected for the tools to measure up to the promise.

Today, though, I and the rest of the WhichPLM team consider 3D as the foremost technology capable of revolutionising the long-standard paradigms of design, development, manufacture and consumer engagement. And all of that transformative potential lies in the creation and manipulation of a single, high-fidelity digital asset - that 3D dress, hat, shoe or handbag - at multiple stages of the product lifecycle.

In my opinion, 3D in all its applications - prototyping, sampling, marketing, collaboration, - is now ready for the mainstream, bringing additional levels of fidelity, integrity and identity to individual styles, and unlocking heightened opportunities for creativity across entire collections.

But there was a notable gap between the introduction of 3D to fashion and the adoption it's now beginning to see across the spectrum of retailers, brands and manufacturers. So why did it take so long for me personally to come around to the concept, and why are the products only now beginning to gain significant traction?

Changing attitudes

Key to understanding the slow penetration of 3D into the RFA industry's

collective consciousness is recognising both the differences and the parallels between fashion and other industries - those where 3D working enjoyed more rapid success.

Because while the root causes are less obvious, the symptoms of this division are clear even to those who develop and market 3D tools to the industry. As Susan Olivier, VP for Consumer Goods and Retail Industry Solutions at Dassault Systèmes explains it:

“While other industries, notably hard goods and automotive, have successfully adopted 3D as an integral part of their design, development, manufacturing and selling processes, the widespread use of 3D is still in its infancy in the fashion and apparel sectors.”

But just how integral is 3D to the product lifecycles in those other industries? To put it bluntly, are they realising huge benefits that the RFA market is missing out on? The short answer is a qualified yes.

One potent example is home furnishings giant (and arguably the king of the catalogue) IKEA. The average print catalogue reader looking for their Billy bookcase will likely have no idea that a considerable portion of what they see is not photography of physical furniture, but rather renders of 3D models (IKEA maintains a library of around 25,000) situated in fully or partly virtual homes.

Speaking at computer graphics show SIGGRAPH in 2014, the IT Manager for IKEA's internal communications agency, Martin Enthed, spoke about the company's migration to 3D-centric marketing, and the catalysts that led to its current approach, where between 60% and 75% of all product images - online and in print - are of products that were never actually photographed. Products that in fact may only have been at the virtual prototype stage when they were staged and shot in a setting that itself may be an idealised composite of multiple different locations.

As Enthed explained, 3D assets began to assume the role usually played by physical prototypes for marketing purposes almost a decade ago, as a way of reducing the logistical difficulty of manufacturing and shipping prototypes to a deadline, and managing the fact that, as prototypes, their appearance may change before they reach the market, necessitating expensive and time-consuming re-shoots.

As attractive (and potentially mind-blowing, depending on how often you browse the IKEA website or pick up a catalogue) as this is, it's important to realise that IKEA is not alone in this approach, and that the company - and others who follow its model - is not creating those 3D assets solely for use in marketing. They may be rendered offline to fine-tune their appearance, but fundamentally the virtual products the company “photographs” have the same underlying principles, structures and materials as the ones it manufactures: they were designed in 3D from the outset, to be re-used in 3D across the enterprise.



The applications of this approach to RFA are obvious. Ours is an industry with a tremendous turnover of new products and collections, and a market where the consumer is accustomed to being bombarded with lifestyle photography and product catalogues all vying for a share of their attention. What consumers likely do not realise, though, is the cost, time and logistical wrangling involved in producing those images, as Ram Sareen, Head Coach and Founder of 3D solution vendor Tukatech articulates:

“Of course the primary applications of 3D systems are for the product development side of apparel (fitting and design), but 3D also plays a big role in marketing and e-commerce. There are many companies that already render high-resolution images in 3D systems and use those renders to display on their websites, allowing them to bypass a lot of the work that goes into displaying their garments in an online store.”

This is a compelling thing to think about - particularly for the growing numbers of retailers and brands for whom e-commerce and social media represent their most fertile markets. But as exciting as it is to consider the reduction in cost and workload that can come from employing believable, high-resolution images, it's important to take a step back and understand precisely where those images would be coming from, and, more importantly, whose task it would be to create them.

“For any technology hoping to find a foothold in the retail, footwear and apparel space, the developer has to think like his or her users”, says Avihay Feld, COO at 3D pioneers Browzwear Solutions. “These are fashion designers and fashion technicians - people who study in a certain way, think in a certain way, and need a user experience that caters to that. Gaining traction with any technology is about unifying it with the user experience.”

In the case of IKEA - and indeed any other producer of relatively fixed form products - those original 3D assets are created in a proven, industrialised CAD solution. The people creating them are either dedicated 3D artists or furniture designers and architects accustomed to working

with complex 3D tools, and this staff makeup is typical of brands and retailers producing predominantly hard goods.

“If you speak to a cross-section of designers working with 3D - particularly in consumer products - you'll find that a lot of them will have been involved in architecture, because that job involves working with 3D CAD solutions every day, as well as using 3D printing for prototyping and modelling”, says Edmond Wong of Hong Kong-based studio ITUM which applies a 3D design to 3D print workflow to different consumer products, and whose MONO eyewear range adorns some of these pages.

As Wong intimates, the ability to work effectively with traditional 3D CAD tools is something we see in product designers, industrial designers and architects, but it is not a skill common amongst fashion designers - technical or otherwise. Indeed, one of the most significant stumbling blocks to broad adoption of 3D working in RFA has been the perception - previously justified - that creating a garment in three dimensions involves working in these kinds of generalised, unfriendly, cross-industry 3D design tools rather than an environment designed for the business of fashion.

In researching some of the more experimental applications of 3D for fashion, I spoke with Oluwaseyi Sosanya, who's a designer, engineer, and a graduate of The Royal College of Arts and Imperial College London. Sosanya works with a team on an augmented reality design tool called Gravity Sketch, and produced a self-directed project called 3D Weaver, which is covered in greater detail in my feature on 3D printing further on in this publication. He is clear on the need for industry-specific environments for 3D working.

“For anyone who doesn't have an understanding of the linguistics and the logic behind 3D CAD software, there are only two ways to engage with 3D creation”, Sosanya says, “either by teaching themselves to work with complex systems; or because somebody releases an alternative that lowers the barrier for entry and prioritises their user experience.”



4N Sapphire Planet photo provided by Dassault Systèmes & François Quentin

Kinematics Dress photo provided by Jessica Rosenkrantz, Nervous System

It's no coincidence that Sosanya and Feld – who come at the problem of 3D creation environments for non-3D professionals from rather different ends of the spectrum – talk often about the user experience, since developments in this area have been instrumental in helping to change perceptions of 3D from a tool shoe-horned into the apparel industry to one designed with its users in mind.

I'll talk in more depth shortly about the other fundamental shift in 3D – improvements to its material simulation and rendering – but it's vital at this juncture to remind ourselves of the wide variety of products that fall under the umbrella of “fashion”, and how wildly different many of them are in terms of composition and construction.

Broadly speaking, 3D solutions (whatever industry they are designed for) are far better at simulating rigid or relatively fixed materials than they are soft, flexible or fluid ones. Offline animators struggle even today to create believable clothes for computer-generated characters in movies, since the human eye is so attuned to the way that cotton, silk, and other materials behave under the influence of gravity, changing light conditions and other factors.

On the other hand, it has been possible to create an extremely believable-looking virtual handbag for many years. Leather panels and metal furniture are both quite inflexible, meaning that the simulation need only account for the way their surface texture reflects light in order to approach realism.

This is still the case today – indeed handbag, footwear and jewellery brands are some of the biggest users of 3D – but with one major difference: the person creating that high-fidelity digital asset no longer needs to be an experienced 3D designer. From the 3D pioneers to the multi-platform PLM and 3D vendors, and to the brands and retailers themselves, everyone appears to have converged around the realisation that a fashion designer needn't understand Bezier curves in order to design a blouse, and that a clothing professional can work in 3D without becoming a 3D CAD professional.

In fact, several vendors have embraced this concept as a cornerstone of their approach, including Dassault Systèmes, whose FashionLab incubator emphasised a fully three-dimensional workflow in demanding areas like couture fashion - not somewhere you expect to find the bleeding edge of enterprise technologies.

I had the chance to meet with haute couture designer Julien Fournié (one of the FashionLab ambassadors) who told me that by designing his latest footwear collection entirely in 3D – including 3D print for prototyping – he felt like “a pioneer in a fashion revolution”. And although, as he puts it, “3D and, more generally, innovation is in my DNA”, Fournié is a couturier, not a professionally trained 3D designer.

MONO eyewear photo provided by Edmond Wong, ITUM



So how is it that, in the space of less than a decade, 3D technologies have evolved enough to graduate from dedicated professionals making static handbags to allowing someone at the sharpest edge of fashion to experiment with new forms and new materials in a comfortable environment, custom built for fashion?

The technical transformation

A few years ago I considered it something of a gimmick because, at that time, the average 3D prototype wasn't suited to replacing its physical counterpart in all the areas that mattered. And this was due primarily to the believability of the end result – the ability for an end user to buy into the idea that he or she could make the same decisions working from a 3D prototype as they could from a physical one.

“I said two years ago that I thought that technical 3D draping was many years away due to rendering limitations with fabric characteristics; I have to say now that I was wrong with that prediction”, admits Ed Gribbin,, President of apparel fit advisors Alvanon Inc. “I think the technologies have evolved much faster than I've expected and the willingness of some major brands and retailers to invest will fuel even more rapid adoption in the year ahead, I believe.”

Let me be unambiguous and say that I agree with Gribbin, and that things have changed far more quickly than I'd imagined possible. Indeed, today, I believe the most significant value in a 3D asset lies in its ability to do precisely that: to temporarily or even permanently replace the real thing. Brands, retailers and manufacturers in 2015 are already able to use virtual garments to make real-world decisions, obtain consumer feedback, and even (as we've seen) conduct marketing campaigns before a physical prototype has been built.

“Today I look at what we're talking about as the digital prototype. It's a single asset: the believable, digital equivalent of the physical prototype

“Everyone appears to have converged around the realisation that a fashion designer needn't understand Bezier curves in order to design a blouse, and that a clothing professional can work in 3D without becoming a 3D CAD professional.”

- the thing that designers are used to preparing, and the same thing that the technical team are used to making”, says Avihay Feld. “It's the same thing that influenced management and merchandisers' decisions on what

“By bringing the end product one huge step closer to the end user, increased fidelity has eliminated the second most prominent barrier to 3D adoption.”

Photo provided by Julien Fournié & Dassault Systèmes

to do next. It's a prototype, but it's digital. And by virtue of being digital, it digitises all of the processes that it touches.”

Needless to say, I agree with Feld. By improving the ability of modern 3D solutions to simulate a wide range of fabrics, and enabling a non-technical end user to interface with those fabrics, vendors have reached what I believe will be the tipping point for a lot of brands and retailers who are exposed to 3D from here on out – the generation of a believable digital asset that has inherent value at every stage of the product lifecycle.

And I'm in good company in thinking this way:

“For us the sweet spot came around four years ago when the technology evolved to the point of believability”, enthuses Sandra Gagnon, Senior Group Manager for Technical Development at retailer Target. “Things like lighting and shading make a difference because, when you're implementing 3D, you're trying to change people's mindsets and get them to make real-world decisions based on a 3D render.”

“People are afraid of losing that emotional, tactile experience of working with real fabric, and without photorealistic rendering you're not going to be able to assuage their fears”, Gagnon continues, “so the level of fidelity we have now was absolutely critical to us in moving forward - in enabling that shift from being a company that just has the technology to one that really embraces it for use in a variety of different ways.”

And this is an opinion that another 3D pioneer, Asaf Landau, CEO of OptiTex shares.

“People have been talking about 3D for about ten years as a relatively available technology, but quite frankly the challenge of cloth simulation was too great until recently. The product, generally speaking, was just not good enough until about four years ago”, Landau says. “We worked on our own solution for about eight years, but it's only been in the last three years that we've seen significant growth, because now the technology can deliver value and the results look good enough to use in sales and marketing as well as product development.”

Although, as I've said, the value in 3D now lies in its accessibility to non-technical designers, I was nevertheless curious to get a look at the technology behind that milestone. I wanted to find out what, exactly, is going on behind the scenes to produce virtual garments that can stand in for the real thing.

Philippe Ribera, Marketing Director for Software at fashion technology vendor Lectra (who produce 3D tools alongside PLM and manufacturing hardware) cites more than 30,000 polygonal triangles in the average simulated garment, and “mechanical properties such as weight, friction, tension, shearing – all defined by the FAST and Kawabata fabric-measurement protocols” as underpinning his solution's rendering capabilities.

Eva Fröhlich, who works in public relations for multi-technology vendor Human Solutions explains that “lighting scenarios, a set of twenty material parameters, weft, warp and bias, self-shading, enhanced fabric texture, drape and elasticity” are all represented in her solution's isotropic and anisotropic simulations, and contribute to an exacting standard of virtualisation.

These nuts and bolts may be a little dry to read, but I cannot overstate the behavioural impact of their results; by bringing the end product one huge step closer to the end user, increased fidelity has eliminated the second most prominent barrier to 3D adoption. If success for the 3D prototype is defined as closing the gap between the physical and the virtual, then accurate rendering and simulation (coupled with the aforementioned improvements to the user experience) represent the most significant milestone on that journey – serving up a digital prototype that, sooner rather than later, will be absolutely indistinguishable from the physical product.

And while change management is certainly required to ease this transition – and is discussed in more detail towards the end of this feature – there is equally a growing sense that, eventually, those who adhere to the traditional way will be left behind:

“Large or small, there will always be some resistance in fashion and apparel brands to any process that limits the touchy-feely, tactile experience of a real product in real fabric”, says Gribbin. “That being said, no one will survive without innovating, especially in the areas of executing product much faster and more accurately.”

“I've been in this business for fifteen years, and I can say with confidence that people have never been as responsive as they are today.”

Adapt and adopt

In evaluating how far these advancements in usability and the underlying technology have led to increased adoption of 3D, it's critical that we remember the timescales involved. A typical technology adoption on the scale of 3D prototyping and sampling, while smaller than a full-scale PLM implementation, nevertheless takes months or potentially years before its true impact can be evaluated. Coupled with this, feedback from industry figures suggests that the real shift in the market's perception of 3D only began in earnest in the past twenty four months:

“Texprocess 2015 really was a milestone for us”, says Fröhlich, speaking about this year's trade fair for textiles and apparel professionals in her home country of Germany. “You could really feel that the wave of 3D is building, because the quality of it has become so much better during the last few years”.

Feld built on this sentiment, giving his own perspective on the comparatively recent swing in the market's attitude towards 3D:

“I've been in this business for fifteen years, and I can say with confidence that people have never been as responsive as they are today. We saw a shift in people's approach starting in 2013, but now, rather than our team actively presenting and selling, people are coming to us.”

But nevertheless, despite the optimism of vendors, our own research demonstrates that adoption of 3D solutions is low across the cross-section of retailers, brands and manufacturers we questioned as part of this year's

end user PLM and E-PLM survey. Only 33% of the PLM customers we spoke to had access to 3D as an integral part of their PLM platform, and fewer still (only 25%) believed that their PLM vendor supported integration to one or more of the best-in-class 3D solutions whose vendors appear in this publication.

Now, this is admittedly a sub-section of the market (selecting as it does only those retailers, brands and manufacturers who have implemented PLM), but broadly speaking we expect a good percentage of organisations who reach the stage where a 3D asset can be inherently valuable across the product lifecycle to have already adopted modern PLM, or at the very least to be considering replacing a legacy PDM platform. After all, to be useful across the extended produce lifecycle, that asset needs to reside in a centralised location.

So why this lack of adoption? The simplest answer – and the most accurate – remains one of timing and exposure.

I have had the luxury of attending multiple events where 3D was demonstrated either by a single vendor or by multiple, and the team at WhichPLM remains in constant contact with the companies that worked to pioneer 3D – many of whom develop PLM as part of the same stable of products. This is not, however, typical of the knowledge base of the average prospective customer of 3D, who may have a passing acquaintance with the technology, but who is unlikely to understand its full scope, and will therefore approach it with caution rather than enthusiasm.

“Pattern makers, sample makers, and designers are often a bit hesitant to trust virtual developments because they are so used to physical samples; they like to touch the fabric, to pull and pin the sample”, explains Ram Sareen. “But once the user sees that there is zero tolerance between what they see on the computer and what they get in real-life, they gain a better understanding of the benefits of working in a 3D environment”.

It may sound trite with a new technology to say that the average customer simply hasn’t seen what it can do, but in the case of 3D Sareen is absolutely right. The shift in understanding – certainly in my case – comes from

“In this sense, a transition to 3D can trigger a sense of fear even more potent than that brought on by a PLM or ERP project, simply because it introduces an element of the unknown.”

exposure to the modern 3D environment, and interaction with a digital prototype that can replicate the look and the functionality of its physical counterpart in a way that satisfies even the most demanding user.

Having undergone this shift in understanding myself – catalysed by some genuinely awe-inspiring demonstrations - I firmly believe that this kind of exposure to the end result is the best way of raising the industry’s awareness of precisely what 3D can do. So, although the attribution rights give them away somewhat, I’d ask every reader to glance over the images that appear in these features, and keep a mental note of which they believe were generated in 3D. I’m willing to bet that a good number of you will miss at least one.

Even for those particularly eagle-eyed readers who can discern reliably between render and reality, though, the fact remains that 3D offers a viable method (one might say the only method) of mitigating the mounting

expense of physical prototyping and sampling – something that is only becoming more acute with traditional methods, as Hizmy Hassen, Chief Digital Officer for Industrial at multinational thread and component supplier Coats PLC explains:

“Coats’ position in the market gives us something of a privileged view of product development, globally, since we have a specific supply chain dedicated to providing all the industry’s biggest full-service vendors. And over the past five years or so [since 3D solutions began achieving better standards of simulation and usability] I estimate that the average amount of product development – in a typical, sampling heavy cycle - has increased somewhere in the region of 25% year on year.”

The challenges and pressures of meeting modern consumer demand in fashion are well-documented. More styles in more markets in a shorter timeframe than ever before. With an average style undergoing two, three, or potentially four sample iterations – each with greater scrutiny for quality, fit and compliance – and a concurrent increase in the volume and the pace at which those styles need to be produced, it’s fair to say that traditional sampling is one of the major contributors to lengthening cycle times and rising costs.

So whether it’s an approach driven by necessity or by a new understanding of the competencies of modern 3D solutions and the viability of digital prototypes, I and the WhichPLM team expect to see a far greater number of customers approaching the market looking for 3D in the very near future. Indeed, this is something Feld and his team believe is already taking place:

“Unlike previous years, the approach isn’t because the customer wants us to explain how it all works. Instead they already have a strong preconception of what they believe 3D can do or what they need it to do, and they want us to demonstrate that. And that’s great, because with the baseline understanding there, we can then really open people’s eyes when we show them just how far things have come”.

From awareness to application

My next feature looks in greater detail at the material return on investment that early and near-term adopters of 3D solutions have been able to realise, but in order to build a more complete picture, I want to also examine a wider range of its potential applications – including those that may not yet have quantifiable returns assigned to them.

As Landau puts it, these applications fall into three different areas: “product development, sales and marketing, and consumer engagement – whether that’s in retail stores or online”.

Theoretically, of course, the applications of a 3D prototype are limited only by the extent of the lifecycle of that asset. In a mature, end to end 3D workflow, there are very few areas of the business that will not be able to extract at least some value from a high-fidelity three-dimensional asset, whether it’s for internal development or external intelligence-gathering.

Ribera encapsulates this philosophy neatly. “It is a fundamental shift in the mindset and environment of product development, and the way these professionals work with other internal and external teams”, he says.

It’s a potentially all-encompassing and irreversible transition, in other words, and one that, if left unchecked and unmanaged, has the potential to overwhelm the business rather than assist it. This is why Ribera is also keen to explain that “the primary applications of 3D working today are mostly product-development oriented. They enable fashion brands, retailers and apparel manufacturers to control fit and validate style earlier in the process, without need to wait for a physical sample to be realised and shipped in order to make informed decisions”.

This is certainly a more grounded view of 3D, but it’s equally a sensible one. As an experienced technology marketer, Ribera is familiar with the need to focus on proven applications, rather than running in headlong with a whole-enterprise approach to 3D that experience tells us will be met with stiff resistance.

“What I think is interesting about 3D today is that no two retailers seem to be using it exactly the same way” says Gribbin. “Some use it exclusively in the creative area, others only for line planning, and others only for the technical area. Very few have integrated 3D enterprise-wide at this stage but I think we will see that begin to happen in short order.”

“Digital in-store experiences are a key part of not just the redefinition of shopping, but the story of the end-to-end lifecycle of a 3D asset.”

And while a growing number of retailers and brands are certainly embracing that enterprise-wide potential of 3D working, a more realistic use case is typically required in order to secure financial investment and executive buy-in to any new technology, as Chris Sanderson of trend forecasters Future Laboratory explained, speaking to the Observer at the start of September 2015.

“The first myth to dispel is that the fashion industry is ahead of the curve,” Sanderson says. “It is, ironically, exactly the opposite. Most fashion businesses are extremely conservative.”

That assessment might be familiar to readers who have undergone a digital transformation project, PLM implementation, or indeed any other large-scale technology initiative that wrought sufficient change for users to become nervous about its impact on their day-to-day tasks. There is often a gap between the long-term vision and the short-term change – one that manifests itself as hesitance, and a need to see immediate, measurable results.

In this sense, a transition to 3D can trigger a sense of fear even more potent than that brought on by a PLM or ERP project, simply because it introduces an element of the unknown. In a general sense, designers, technical designers, sourcing managers can visualise how things might change after the roll-out of a new database, or a new materials library, but the introduction of an entirely new dimension – one that essentially every department will one day be expected to leverage – can be paralysing.

It’s little wonder, then, that most of the industry figures I spoke to were equally conservative and practical about the immediate applications of 3D - although many were also willing to talk about the longer-term potential to unify product design, development and marketing with a universal language.

In the immediate term, Susan Olivier explained, customers of 3D should “focus initial efforts on tactical, time-sensitive deliverables early in the development cycle” and only later “concentrate on areas where 3D prototypes can transform costly physical tasks (digital photography for brochures, salesperson samples) into a digital process that can save time and cost”.

Mary McFadden, Executive Director for CAD Product Management at Gerber Technology (also a vendor of PLM, 3D and other solutions, as well as manufacturing hardware) has similarly sensible applications in mind for customers beginning their 3D journey:

“Often you see plotted paper patterns taped together, or half a sewn sample hung on a dress form. That is not necessary when you validate with 3D – it’s a great tool for pattern makers – but it can also be used by the designer to validate their design intent. It’s a way of transforming the design and development processes by enabling greater visualisation and collaboration at the early stages.”

More enamoured of the heady, longer-term IKEA vision is Eva Fröhlich, who’s keen that the broader applications of 3D not be forgotten:

“Of course, a garment still has to be designed and 3D offers possibilities to do this in a more realistic way with many other benefits. But 3D also offers completely new ways of working. We believe that the unity of PLM and 3D has the potential to change the whole apparel industry fundamentally – for instance, order books can be compiled long before prototypes are actually produced.”

Reaching retail

Thus far, I’ve focused on the product development applications of 3D working, but as Fröhlich hints at, it’s critical to remember that a 3D asset created to meet the pressing challenges of design and development is not discarded afterwards. And although we understand how 3D can have a significant impact on the logistics of assembling online and offline catalogues, it also has a role in other retail channels.

“In the coming year the major applications for 3D will be design, fitting, merchandising and communicating”, says Feld. “Then the same technology will be used to support digital sales, with 3D assets operating as part of an online or offline shopping experience.”

I have written about the changing nature of bricks and mortar retail before, but I want to reiterate that digital in-store experiences are a key part of not just the redefinition of shopping, but the story of the end-to-end lifecycle of a 3D asset.

While IKEA, with its vast suburban warehouses, operates an entirely different model, apparel, footwear and accessories are usually sold from stores with a much smaller footprint. That being said, though, both the furniture catalogue and the high street store serve as windows into the brand lifestyle and its associated product ranges. In IKEA’s case, that full product range is on-site, a short hike through looming shelves away, but for a smaller retailer or brand, making its full range of styles (in all sizes and SKUs) available to every shopper is next to impossible.

The primary threat to physical retail space as it’s traditionally been defined, then, is the wealth of choice and the ease of access to the entire catalogue that’s available online. But with 3D assets, concerns about inventory space and accessibility all but vanish: with the digital prototypes and digital finished products collected in a centralised database, a simple touch screen interface can open entire collections to a single consumer, and even allow the retailer to focus-test consumers with products that are yet to enter production.

This, for me, is the embodiment in what’s been referred to as omni-channel retailing (although I’ve always preferred to just call it “modern retail”) with little or no distinction between online and in-store shopping, enabled by seamless access to inventory data, sizing information, but also the digital twin of every physical product – present and future.

“3D has had a huge impact on the way fashion brands operate today, but it’s going to have an even bigger impact on the way we buy clothes tomorrow”, says Landau. “We’re going to be able to make that same, perfectly sized and draped 3D asset that’s being used by technical designers accessible to the consumer, who will be able to try it on their body virtually, and increase the percentage of clothes we buy online, moving towards

“In many ways, the industry has already undergone its most significant transition: moving from paper-based to digital methods.”



“With 3D assets, concerns about inventory space and accessibility all but vanish: with digital prototypes and digital finished products collected in a centralised database, a simple touch screen interface can open entire collections to a single consumer.”

Polygonal Kinematics jewellery photo provided by Jessica Rosenkrantz, Nervous System

the larger percentages of e-commerce sales we see in other industries.”

As one of the few people I interviewed to have seen the transition from 2D to 3D working in other industries, Brion Carroll (VP of Retail and Consumer Global Business Development for PTC, developers of the renowned Pro/Engineer industrial 3D CAD tool, now PTC Creo Parametric) was careful to balance optimism for the potential of 3D with a more measured attitude to the change management involved, but he nevertheless presented a captivating picture of how far a fully unified 3D design to retail workflow might go:

“Theoretically I should be able to sit at home and turn my television into an intelligent dressing room, and be able to order garments online after trying them on virtually by standing in front of my TV. And I should be able to do that with the assuredness that when the product arrives, I’m not going to have to return it because it doesn’t fit, or because I customised the sleeve or the collar in an incompatible way - because that garment was built from automated pattern generation using tried and tested components.”

Carroll is under no illusion of how distant that scenario is from contemporary reality, but equally there’s nothing in his picture that we can’t extrapolate from current use cases for 3D assets in the retail experience. For example, François Quentin, independent designer, owner of the 3D-designed watch brand 4N, and another FashionLab ambassador says:

“My role is to adapt my product to my customers without losing sight of the spirit of my brand. If I have a customer from Singapore, for example, I can set up some variants and configure my products based on his needs. Working in 3D is key to providing that perspective: I can present that customer with the different options virtually, and validate the final choice with them virtually before I begin production.”

Personalisation on this small scale is certainly possible for luxury brands, since the relatively high price attached to the end product justifies the variation. But working in three dimensions also presents other, more experimental approaches to mass customisation.

Nervous System (a “generative design studio” inspired by natural forms and processes run by Jessica Rosenkrantz and Jesse Louis-Rosenberg) has experimented with an entirely different approach to a 3D design-to-consumer workflow, by producing open systems that take input from the end user and generate “unique and affordable art, jewellery, and housewares”.

You’ll see Nervous System’s Kinematics range of apparel and jewellery in these pages, and the products themselves are interesting in that they are composed of 3D –printed interlocking components that allow both fixed forms – jewellery – and fluid ones – apparel – to behave in their own unique way. As Rosenkrantz explains:

“Bodies are 3-dimensional but clothing is traditionally made from flat material that is cut and painstakingly pieced together. In contrast, Kinematics garments are created in 3D, directly from body scans, and require absolutely no assembly.”

But if the products are fascinating, it’s the potential for customisation and retail at a democratic level that’s even more captivating. By opening up the tools used to create their products – a further example of the

importance of the user experience – Nervous System allows for both a unique retail experience and theoretically infinite customisation. As Rosenberg puts it, “there is no definitive, final product, and instead the many designs created allow for mass customisation”.

A link to Nervous System’s Kinematics Cloth applet is available at the end of this feature for readers looking to experiment, but for retailers who want to maintain inventory and a more traditional, personal browsing experience, the 3D asset and the 3D environment in general still has value.

“As traditional retail is under tremendous pressure due to the highly competitive landscape in high-street fashion and online sales, the in-store customer experience is crucial to attracting customers and to increasing the conversion ratio in store”, explains Clemens Kruiper, Senior Sales Consultant for 3D store visualisation vendor Visual Retailing.

“Creating 3D virtual stores with automatic capacity planning and automated visual merchandising planogram production is key for every retailer”, Kruiper explains, “and 3D really complements their systems by visualising the product flow from planning, sourcing towards retail execution”.

Putting people in the picture

Of course, hangers and store shelves are only ever the intermediary step for clothing and footwear – the final destination of any product is on a human body. In a traditional prototyping and sampling process, a series of standard forms (technical mannequins) and fit models serve as stand-ins for the target consumer.

This is one area in which 3D working can go a step further than replicating traditional functionality, and actually provide enhanced opportunities and significant returns. Physical forms and fit models are limited by availability, cost, and range, whereas a library of demographic-appropriate 3D equivalents – referred to as avatars – has far greater flexibility.

“This is the most important factor for developing products virtually”, says Sareen. “To have zero tolerance between virtual and physical product, we must have the exact replica of the human body where the physical product is to be tested.”

Indeed, Gribbin tells me that around 30% of all fashion bought at retail is returned, with fit being the most prominent culprit, and without an appropriate way of adjusting the fit of 3D samples, that proportion was only likely to grow. This was the driver for his company assembling what he refers to as “the largest database of 3D consumer body scans, with over 400,000 from more than 26 countries”.

Body scanning is, in and of itself, not a new technique, but its applications to a 3D design and sampling workflow are being realised by a growing number of brands and retailers. In addition to Alvanon’s avatars – which are used by a number of the solutions that appear in this publication - huge cohort studies have been operated in different territories to build a scientific picture of the way that different ethnicities and body types scale with size.

So, while a 3D customer can if they desire conduct their own in-store scanning programme (which may be appropriate for those brands who cater to a particular segment of the market, such as athletic wear) to better understand the bodies that will be wearing their clothes, Landau believes that the average consumer can obtain the same level of fit without what he feels are intrusive methods of measurement:

“I think that asking a shopper to stand inside a scanning booth, or even to pose for a photo in front of their computer, is the stage where you stand to lose a large majority of your audience,” Landau cautions. “People have an aversion to that. Luckily, databases already encompass the 15,000 or so different body types that exist, so if the consumer can instead provide some key measurements that they’re likely already aware of, we can correlate

that to the nearest avatar, which will be accurate to around the 2 centimetre margin of acceptability for fit.”

A material world

As a customer of 3D, developing a new product, we now have a digital silhouette, draped over an avatar that we feel accurately represents our target market, and that can be scaled in a non-linear fashion to create demographic-appropriate sizes. But while we can be confident that whatever material we assign to individual components will behave in a way analogous to its real counterpart, we still need to define where the parameters of those materials come from.

Given WhichPLM’s clearly documented stance on PLM’s role at the centre of the product design and development ecosystem, it will come as no surprise that the only logical answer for me is a fully-featured materials library in PLM. And I’m not alone in reaching that conclusion:

“As a brand or a retailer, you want to have one single repository for your data, and PLM has emerged as the definitive location”, Landau says. “PLM also holds all of the core information that you need for 3D, although 3D also requires a few other data points to be added to the materials library, where stretch and bend and sheer and so forth need to supplement existing material definitions.”

Properly selected and implemented, a modern PLM solution is capable of consolidating a huge range of business-critical data, and serving as the backbone of seamless integrations between extended-PLM solutions. As the single source of product data, PLM can also be extensively configured, as Landau points out, to provide a method of assigning entirely new properties to existing styles – including the kind of exhaustive material information required for single-click integration between the PLM style and its 3D counterpart.

As Susan Olivier explains, “3D prototypes used in conjunction with PLM, keep design, product development and manufacturing connected via the ability to exchange information visually and collaborate around shared images; more importantly it keeps the design and edit process online. In this way, 3D together with PLM, provide opportunities to bridge the gaps that can arise between the many departments involved in product and collection development”.

But while material characteristics drawn from PLM into 3D make a clear cut case for integration, it’s important that any 3D implementation project



Photo provided by Dassault Systèmes

“To achieve zero tolerance between virtual and physical product, we must have an exact replica of the human body where the physical product is to be tested.”

consider which other solutions – particularly e-commerce and marketing – will need their own integration, as a method of allowing the broader enterprise access to the same 3D asset, now assigned a particular weight and colour of cotton.

“Another tipping point for our transition to 3D was integration” says Alexis Kantor, Director of Product Development at Target. “We moved from approaching it as a potential solution for garment prototyping to using it as a springboard for a much broader discussion about end-to-end working, data, and asset creation”.

The final article in this publication examines precisely that kind of considered, architected integration in detail, and to make the process of selecting a 3D vendor simpler, our vendor listings also include details of each solution’s inputs and outputs for the purposes of extended PLM integration.

In recognition of this, I should emphasise that PLM is not a pre-requisite for obtaining value from working in 3D. Provided a retailer or brand has a centralised database that contains material definitions and the full suite of characteristics necessary for fabric simulation, most dedicated 3D vendors will provide a bespoke integration, as Feld explains:

“It’s not about integrating to PLM as a rule; it’s about what works for the user. If a company’s material definitions are stored in a comfortable, accessible database - whether that’s PLM or any other system - then there’s no sense in reinventing the wheel and building another way of storing and accessing fabric information.”

The new dimension

The retail, footwear and apparel industry is accustomed to change. From the day-to-day - new styles and collections being created at a quickened pace to keep up with consumer appetites - to the longer term, as manufacturing shifted offshore to meet demand and maintain margins, and is now filtering backwards through proximity sourcing initiatives and environmental and ethical legislation.

In both mature and emerging markets, fashion is perhaps the closest industry to the shifting social status quo, requiring brand and retail owners to keep a finger on the collective pulse of trend and economic stability.

In many ways, the industry has already undergone its most significant transition, moving from entirely disconnected, paper-based methods to a digital workflow, with an entire generation of designers accustomed to drawing in Adobe Illustrator, and an army of suppliers now used to being fully connected to PLM for product development purposes.

So whether a particular brand realises it or not, they have the capacity to make the transition from a two-dimensional digital mindset to a three-dimensional one, provided they do so in a way that allows their end users to feel at home.

“Our technical designers were so accustomed to working with a specific



MONO eyewear photo provided by Edmond Wong, ITUM

set of mannequins that when they saw a 3D avatar with a hairstyle they weren’t expecting, it gave them pause”, says Kantor, who emphasises, too that “part of making the transition to the new dimension is cultural rather than being a matter of software or hardware - it’s about finding the common thread that makes the adjustment feel less sudden and less strange”.

But despite our resilience and adaptability, change to the delicate balance of people and processes that create the products we sell is not something to be taken lightly. Although the value of working in three dimensions has been proven time and again in a diverse range of other industries, their own transitions were not without teething problems, as Brion Carroll told me:

“It wasn’t until the mid-80s that people even began to talk about 3D CAD in hardline products. Prior to that, designers worked on 2D planes - top, front and sides - and it was a tremendous feat of imagination for them to conceive of first isometric models, and then fully three-dimensional ones”. Carroll went on to say that, “changing that paradigm took years: not just for the technology to mature, but for the mindset to shift amongst designers and engineers.”

So like any enterprise-level project, the key to embracing 3D lies in applying due diligence to your selection of software, and an uncompromising eye to your preparation. Because, despite now offering what I and the brands whose ROI results appear in my next feature believe to be a compelling business case, the move to the new dimension is one to approach with an open mind.

“3D is an opportunity to do things differently, absolutely”, as Feld puts it. “People need to understand that the things they did yesterday are not necessarily going to be the same as what they do tomorrow – it’s about changing the way we work, but doing it very carefully”.

Readers interested in experimenting with the same tool used to make the Kinematics dress seen in this feature should visit: <http://n-e-r-v-o-u-s.com/kinematicsCloth/> ■





by
KILARA LE

BUSINESS PROCESS EXPERT KILARA LE HAS CONTRIBUTED TO ALL OF WHICHPLM'S PUBLICATIONS TO DATE, COVERING THE EXTENDED PLM ENVIRONMENT, THE IMPORTANCE OF FIT, AS WELL AS – IN OUR 2014 ANNUAL REVIEW - AN EARLY LOOK AT 3D PRINTING. IN THIS EXCLUSIVE EDITORIAL SHE EXAMINES THE FASHION INDUSTRY'S HISTORY OF INNOVATION, AND THE MELDING OF CRAFTSMANSHIP AND TECHNICAL EXPERTISE THAT WILL BE REQUIRED FOR FASHION AND TECHNOLOGY TO TRULY MIX.

The fashion industry's love affair with technology has kicked into an even higher gear recently, with 3D, avatars, wearables, and virtual try-on simulations getting a lot of attention from brands and consumers like. Advancements in visualisation and simulation are piquing the interest of fashion designers, and helping to fulfil consumer expectations of accessibility and personalisation.

To meet those expectations and avoid missed trend opportunities, technology is being used across the board – something that is, in turn, forcing strategies to shift. These changes in how we all think about and produce clothing are aligning the world of technology with the world of fabrics, patterns and construction. And while other industries - whose products don't need to move and flex with a person in the middle of them - have been using 3D visualisation software for decades, fashion is now catching up. Finally.

But although proven technologies exist for all of these applications, it can be tempting to think that technology is all that's required, when in fact a more significant shift in understanding is sometimes needed from designers and product development teams – a willingness to recognise that the tools won't be the only things to change.

To get a better handle on how the industry sees this kind of transformation, I set out to ask some experts - people on the front lines and at the cutting edge – how they believe technology is transforming the business of fashion.

Bridging the digital divide

Every idea has its time, and perhaps that time is finally coming for the adoption of 3D CAD and digital visualisation in fashion. It seems as though this has been on the cusp of mass market adoption for decades, but over the last few years simulation of fabric properties and construction mechanical properties has become more accurate, and intuitive enough to overcome the stigma of "stiff" or unrealistic rendering. Across the board, the visual portrayal of fabrics, stitches, trims, digital human avatars and digital fit forms has greatly improved. And it's these advancements, combined with a new generation of graduates who should hopefully be digital natives, that look to be finally turning the tide on the adoption of 3D for fashion.

"This generation will drive it fast," says Yoram Burg, President of Optitex USA, "the average age is 22." He is clear, however that they will be the translators, at least at first, for design, product development teams and patternmakers – not the vanguards of a sudden shift.

(It's worth noting that several of the companies I spoke with are also interviewed elsewhere in this publication, so I encourage you to read WhichPLM's own editorials to build the complete picture of the fashion industry's transition to three dimensions.)

Speaking of the new generation, though: wearable technology has hit the headlines in a big way lately – so much so that the technologically amazing has started to seem almost commonplace. The average shopper gets the concept: clothes or devices that we wear that do stuff for us or tell us things. Coming back down to earth, though, what exactly is a 'wearable', and what can it do for me? Or you? Or society as a whole? The media would have us believe that this intersection of fashion and technology is going to change the world, but I'm interested to know how it's going to change the RFA industry, and how – or not – it might mesh with the rise of 3D design.

Presently, when we speak of wearables, we are still talking about more engineered products: wirelessly connected versions of hardline accessories like bracelets and watches that people have been wearing for generations. They are designed on industrial CAD systems such as SolidWorks, and for the most part just need to flex with the human body, and not move around it with ease like our everyday clothes do.

The tools used for designing modern wearables are interesting precisely because, as of late 2015, they represent a division between the fashion and the technology that is extremely close to being bridged.

Apparel CAD systems are different from industrial CAD programs for a multitude of reasons, not least because they boast functionalities that mimic traditional patternmaking methods. As 2D patternmaking and 3D apparel CAD software begins to incorporate the lifelike lighting, movement and backgrounds that have been common features of programs like SolidWorks (and equivalents like CLO 3D, Maya, 3D Studio Max, and Rhino) for years, the ability to create a virtual world for the designer and the

THERE WILL BE HURDLES SUCH AS HARDWARE COSTS, RENDERING SPEEDS, AND PROCESS CHANGES ALONG THE WAY, BUT IN AN INDUSTRY WELL-VERSED IN UPGRADING INFRASTRUCTURE AND EMBRACING CHANGE, I DON'T BELIEVE THESE BARRIERS WILL STAND FOR LONG.

THE DEATH OF THE SAMPLE AND THE RISE OF THE VIRTUAL FASHIONISTA

HOW CAN WE BRING FASHION AND TECHNOLOGY TOGETHER IN A WAY THAT “REMAINS TRUE TO THE WHIMSY AND THE SOCIAL AND EMOTIONAL REASONS WE WEAR CLOTHES”?

consumer edges closer to reality, enabled by technological and process advances from both worlds. Gerber Technology's recent announcement that their new 3D CAD program will be using the open source Blender software as their platform is emblematic of this trend, as it opens up more possibilities for inter-industry collaboration.

There will be hurdles such as hardware costs, rendering speeds, and process changes along the way, but in an industry well-versed in upgrading infrastructure and embracing change, I don't believe these barriers will stand for long.

“Another element to take into account is resistance to change. We operate in an industry that is very fast,” says Laura Gelis, Worldwide Marketing Manager for Lectra Fashion Design and Product Development. “Teams are constantly rushing to meet extremely short deadlines. In some cases those people are reluctant to change by fear of destroying a fragile equilibrium.”

Laura is absolutely right to speak of a careful balance, although I believe the balancing act goes beyond that of making sure day-to-day product design and development can continue alongside the implementation of new technologies. As I see it, a kind of democratic, mutual understanding has existed between fashion and technology for several years – something highlighted in the 2014 WhichPLM Annual Review, when Ben Hanson wrote about the trend of consumer technology firms like Apple poaching fashion executives.

I believe this sort of gentleman's agreement is soon going to become a full-on collaboration, with fashion and technology agreeing to work together to better serve their mutual goals.

For example, with truly integrated wearables (i.e. those that aren't just “smart” versions of existing products) come a range of engineering considerations that simply are not dealt with or even thought about by your average apparel design team. Non-flexible components; power sources; circuit board design; washability; trackability.

There is also the consideration that consumer electronics products are usually developed over the course of years, not months. While this poses an immediate challenge for technology teams looking to enter fashion, it's also one example of how multidisciplinary teams will have the advantage – understanding software development, electrical engineering, materials science, the human experience and the importance of clothing fit.

And make no mistake, this kind of multidisciplinary approach is going to be a requirement if fashion and technology are to integrate successfully. As Wearable Technology Business Unit Lead for WWA Advisors and Founder of Principled Design, Despina Papadopoulos points out during our interview, most of the commercially available “wearables” today don't really integrate with the ethos of fashion, they simply operate and connect as an additional layer on top of clothing, without really sharing a sense of what makes clothing matter.

Important steps are being taken to address this disparity, though, including Google's announcement of an integrated sensing fabric collaboration with Levi's called Project Jacquard, which embeds capacitive touch functionality into yarn. The name is a nod to the precursor of the

computer, the Jacquard weaving loom, industrialised in the 1800's at a time when fashion drove innovation – something I believe we'll see again.

So, to borrow Despina's words, how can we bring fashion and technology together in a way that “remains true to the whimsy and the social and emotional reasons we wear clothes”?

A major component of this is likely to come from that merging of flexible electronics and textiles at the design stage – somewhere that 3D design and visualisation tools will have the edge, since they allow creative professionals to accurately place seams and components to be functional and interactive as well as aesthetically sound.

The designer of tomorrow, then, needs an understanding of circuitry, programming, materials, and user interface. A tall order for anyone, but luckily they still have a bit of time to learn.

The fact remains that there are hard components in this equation that we don't yet have substitutes for, according to Jess Jur, Leader of Thrust V at the ASSIST Lab and Assistant Professor in Textile Engineering at N.C. State College of Textiles. Project Jacquard is a step in this direction, and several technology developers (some interviewed in other editorials in this publication) have opted to translate advances made in the medical world that have met FDA approval and rigorous testing to more style-driven applications.

As Jur points out, though, even these approved technologies won't necessarily make the transition to fashion without considered adaptation. In the case of a wearable ECG (electro cardiogram) each patient's body is different, which complicates things because you need to have intimate contact with sensors at an exact pressure – something easier said than done with limited sizes and linear grading.

This is where some of the elements that the fashion industry has been toying with for years - specifically personal avatars from body scans and made to measure capabilities baked into 2D apparel CAD software – can help to advance the concept of technologically viable, fashionable wearables.

But even these have their limitations. Body scans and their resulting avatars enable accurate representation of a human body for some placement and measurements and for more accurate fit forms (both physical and virtual) but still don't simulate the changes in body measurements due to breathing, or cater particularly well for the parts of the body such as abdomen and thighs that are more compressible on some people than others.

Another issue applicable to mass adoption is that most of the virtual 3D avatars don't accurately represent the shape of the person being body scanned; they change the company's idealised avatar body to match the measurements entered. Distribution of body shape is quite important when making patterns and fitting garments, and let's not forget posture. While now, everyone looks pretty good as an idealised avatar, which is fine for online shopping or virtual try-on, this is yet another opportunity for software companies to mesh tradition and reality with technology.



In short, a wearable technology that requires a tight fit or a particular positioning (for sensory feedback or user interface purposes) must be designed to more exacting standards than ever before. And while the addition of extreme animations to virtual avatars (such as squatting and jumping) go some way to remedying this – as seen in Tukatech's solution – there is still some distance to go before electronic components and patterns can be perfectly fitted in three-dimensions.

Benefits for the brand and retailer: sample reduction, showrooms, faster iterations, direct to pattern capabilities

Everything I've written about so far is predictive – at least for the moment. The technologies, the resources, and the consumer appetites all exist today, but there remains a change in mindset amongst brands and retailers who must first embrace digital-first ways of working.

Luckily, rapid progress is being made in this area. Big businesses have already begun to achieve dramatic savings through the adoption of 3D prototyping and sampling, and as with all enterprise technologies, these demonstrable results are beginning to influence a broader shift in understanding.

And as more high-level executives buy into the benefits that can be achieved through adoption of 3D CAD, the internal resistance (both mental and fiscal) will continue to break down. A recent Sourcing Journal Online article highlighted a 65% reduction in sampling by retailer Target (who are interviewed in another editorial in this publication) and a 2-week gain in product development speed.

Amongst other retailers and brands, Target took the proven approach of analysing the impact that 3D could have across design, merchandising and all other departments that would benefit from working in a new way. As you might imagine, the change in mindset that this required was in many ways as significant as the implementation of the software itself, and many organisations have chosen to work with an informed third party consultant to help manage this shift to digital-first thinking.

As Gelis pointed out in response to my question on challenges to adoption, “That's why it is important to be fully accompanied in the process of adopting a 3D virtual prototyping solution. Consultants will be able to design a path for implementation taking into account all the specificities of a given organisation (skills of the people, existing process, organisation and more).”

Filling in the gaps

We all know that technology is a tool and not a solution. We can live without it, but it makes our lives better - or at least that's what we tell ourselves. 3D in and of itself isn't going to change the world of fashion; it's only through early adopters and responsive software companies that advances like truly integrated wearable technology can reach consumers.

One concern that an interviewee addressed quite neatly is the common perception that technology's intrusion into fashion is going to spell the end of style, robbing us of both unique fashions and commoditising the craftsmanship that goes into creating them. Again design is key, but its not just aesthetic design, it's design thinking, creative problem solving and asking users (i.e. the human beings who actually wear the clothing) what their needs are.

This misconception fails to take account of one key aspect of this whole transition, though: the fact that wearable technologies will still require traditional fashion skills in order to really penetrate the market. When I asked Papadopoulos what patternmaking software she used, she told me that she works with a patternmaker who does 2D flat patterns by hand. And even Jur (who you'd expect to be at the forefront of modern methods) said that he and his team are printing some of their circuits in electronic ink using, wait for it, screen-printing screens.

These kinds of traditional techniques should ensure that, however advanced the technology embedded in them becomes, clothing will remain a uniquely personal and expressive thing – and perhaps that the fashion industry will find itself teaching other sectors a great deal. ■



by
BEN HANSON

THE ROI ON 3D

BEN HANSON'S SECOND FEATURE IN THIS PUBLICATION EXAMINES THE SIGNIFICANT REAL-WORLD VALUE THAT RETAILERS, BRANDS AND MANUFACTURERS HAVE BEEN ABLE TO OBTAIN FROM WORKING IN 3D, AND CONSIDERS HOW ADDITIONAL OPPORTUNITIES MAY (OR MAY NOT) COME FROM A NEW GENERATION OF APPAREL INDUSTRY PROFESSIONALS.

A lot of the emphasis when it comes to 3D working is, understandably, on potential. It can be difficult to discuss the immediate applications of 3D without getting carried away, since its essence – creating photorealistic digital equivalents of physical products – lends itself to extrapolation and a kind of domino effect comes into play.

If we can do this, the reasoning goes, then that becomes possible, until very quickly we're thinking again about an entire, end-to-end 3D workflow from the outset. And as exciting as this prospect is, it remains a distant goal for most retailers, brands and manufacturers – one that requires a great deal of preparation and a series of intermediate steps to arrive at.

So while 3D working is rife with promise and potential, business cases are not made of these. The ability to completely transform the way we approach the cycle of product design, development and selling is something that must be tempered by a focus on the value that can be realised along the way.

Fortunately, in my conversations with businesses working with 3D – either as 3D artists, developers or customers – ample evidence emerged to suggest that an informed investment in the right 3D solution(s) can deliver value above what even evangelists might expect.

This is unusual in enterprise technology projects, and even with PLM itself, where it's common to place several caveats on the value that a customer can expect to obtain from it. To achieve truly lean processes, for example, they must invest a good amount of energy and discipline into understanding the bloat in their current ones. To convince designers digging their heels into the mud to start creating styles in PLM, they must seek out a vendor who offers low-administration, bi-directional integration between PLM and Adobe Illustrator.

Now this isn't to say that 3D comes without those sorts of provisos, but despite bringing an entirely new dimension to the table, the actual value equation (money in versus productivity, efficiency or profit out) of adopting 3D can be quite simple in comparison.

"The ability to completely transform the way we approach the cycle of product design, development and selling is something that must be tempered by a focus on the value that can be realised along the way."

For instance: virtually all brands and retailers spend more than they would like on having iterative, physical versions of footwear, garments and accessories made before the final, approved version enters production. The expenditure involved in this process isn't limited to the materials and the labour it takes to design and make these prototypes and samples, but also the cost and time spent shipping them from one side of the world to another.

This isn't an outlying perspective – it's typical of virtually every brand that creates products in one country and manufactures them in another, and whose business model relies on those products reaching consumers as quickly as possible.

"We estimate that the industry is spending between \$6 and \$8 billion per year on samples. About 75% of those can be handled digitally, where the costs are a fraction of what they are for physical samples."

Indeed, being able to slim this entire process down by 75% or more – and that figure isn't guesswork – is what Philippe Ribera, Marketing Director for Software at Lectra refers to as "a business imperative".

So in the broadest sense, the return on investment (hereafter ROI) potential of 3D is significant and even, as Ribera says, pressing. Industry insiders suggest that the volume of physical prototypes and samples being produced is rising at a rate in excess of the number of new styles being introduced year on year, creating a vicious cycle that has the potential to significantly erode margins and delay the arrival of garments at retail.

The task of any project team looking to move beyond an awareness of the need for 3D (and the viability of digital prototypes for replacing physical samples) then lies in underlining that sense of urgency and potential with raw numbers. And again, the users of 3D I spoke with were almost universally able to quantify the value that they had been able to obtain from their investment.

One of the earliest adopters of 3D working (what it calls "virtualisation") was Adidas, which reported in 2013 that it had been able to eliminate more than one million material samples from its global product development processes. While that sounds impressive for a company that began experimenting with the technology in 2004, it becomes far more inspiring when we consider that the technology only came into full use in 2010, meaning that a million samples' worth of cost and delay had been eliminated in just a few years.

And Adidas is by no means alone:

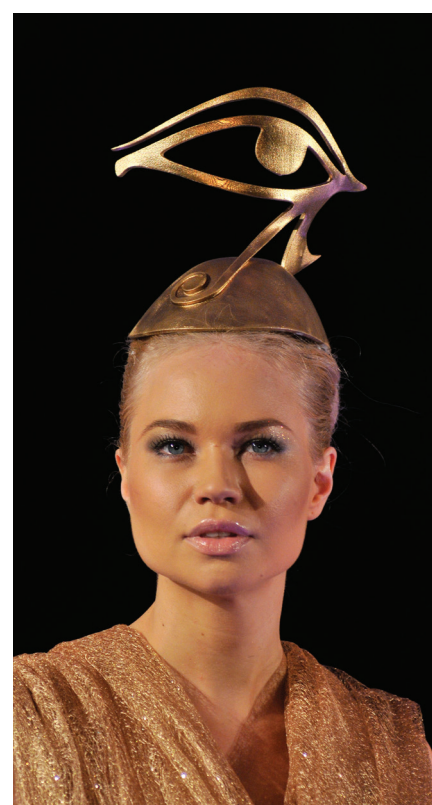
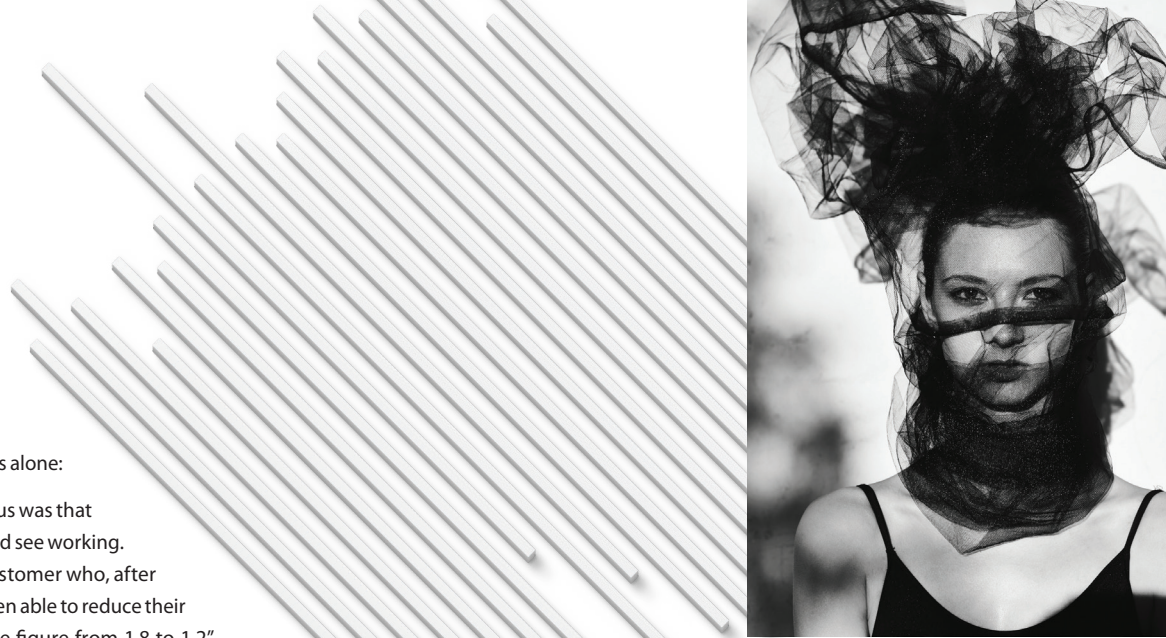
"The tipping point for us was that 3D was a solution we could see working. We visited an existing customer who, after eighteen months, had been able to reduce their average sample-per-style figure from 1.8 to 1.2", says Alan Wragg, Category Technical Director at F&F, the clothing label of Tesco. "After a shorter period we have already been able to reduce our own 1.5 samples in kidswear and essentials down to 1.2. If we can save almost a full sample per style, that's an additional week or fortnight on our lead time, and at the kind of scale we produce, that equates to a massive saving."

While the exact monetary saving that individual brands and retailers are able to realise by switching to 3D prototyping and sampling workflow varies, Asaf Landau (CEO of 3D pioneers Optitex) has dedicated enough of his life developing 3D tools for fashion to assign a US dollar figure to its industry-wide potential:

"We estimate that the industry is spending between \$6 and \$8 billion per year on samples. About 75% of those can be handled digitally, where the costs are a fraction of what they are for physical samples. So of that \$8 billion we're talking about an industry-wide saving of approximately \$6 billion on samples alone."

These are not small numbers, and depending on the quantity of physical samples an individual brand or retailer produces annually, they may represent a compelling case for adoption in their own right. But is reducing the cost of sampling the whole story when it comes to obtaining value from 3D?

We already know that the traditional sampling paradigm doesn't come cheap, but it's important not to underestimate its effect on the ability of brands and retailers to actually get their products from concept to consumer before that concept falls behind trend. To focus solely on the cost of physical product iteration is to ignore the increase in cycle time that comes from waiting for a sample to clear customs on its way from Sri Lanka to San Francisco, only to find that a seam or hem or button needs moving and the whole process has to be repeated again.



"We know we can build the right product, get it to market at the right time, and improve both fit and quality simultaneously."

"Time is the new money", as Ed Gribbin, President of apparel fit consultants Alvanon puts it. "The real benefit to fitting in 3D, in my opinion, is not in reducing returns, but in getting product to market faster. The brands that have the freshest product will be the winners, not only in grabbing consumer attention but in a whole host of financial metrics as well, including inventory turns, markdowns, and obsolescence."

Speaking at the Association of Suppliers to the British Clothing Industry (ASBCI) "Fit Factor" conference in 2015, Wragg was candid about F&F's ability to reduce delays. "Cutting lead times by one to two weeks on around a third of our styles", Wragg said, "added between 4% and 8% to net margins, and generated savings of between £20 million and £40 million". [Roughly equivalent to between \$40 million and \$60 million US as of September 2015.]

And this reduction in the cycle of concept to consumer has an impact beyond the financial, as Susan Olivier (VP for Consumer Goods & Retail Industry Solutions at Dassault Systèmes) explains: "removing the wait time for physical samples can represent a dramatic reduction in lead times, combined with the ability to make more accurate product decisions".

This opportunity to optimise product development cycle times isn't exclusive to the mass market; a 3D workflow also has the potential to transform the way that luxury and bespoke products are fitted and made, as Anna Malkan (Head of Business Development & Communications for depth-scanning hardware and software company Volumental) explains:

"We collaborated with footwear brand SCAROSSO, who are using customers' depth-scanning data to create custom lasts, which then undergo the traditional luxury, leather craftsmanship processes. For a shoemaker to measure a single customer's feet takes about twenty minutes (excluding travel time) but with 3D data you're able to arrive at the same set of metrics in about fifteen seconds."

Volumental produces hardware designed to quickly scan body measurements in medical and retail settings, as well as the software that interprets that data and will, eventually, enable consumer-grade depth cameras on smartphones and laptops to produce similar results. Malkan explains their goal as being that, "in the future our body measurements and data will serve as inputs for the products we wear – from footwear to apparel to eyewear," and she believes accessible body scanning in

physical and online retail will be a major contributor to improving the fit and quality of the end product.

As key contributors to a brand's reputation, F&F also cite fit, quality and consistency as being extremely important metrics that a move to 3D working can improve.

"We were experiencing problems of consistency with fit. Prior to adopting 3D, we might make a standard t-shirt in China, India, Sri Lanka or Turkey, and although the measurements were the same, the fit was coming out different - with multiple different interpretations of the same block", says Wragg. "We wanted to get that under control. We wanted people to trust the F&F brand: whether it's a pair of formal trousers or a pair of jeans, we need waist 32" and leg 34" to remain consistent wherever it was made."

Although Wragg stops short of articulating the outcomes of that kind of trust in a brand, Olivier explains their value as being "fewer product markdowns, sell-offs and inventory liabilities" – all direct and quantifiable methods of assessing the value of fitting in 3D.

Taken together, fit and lead time are, however, only part of the recipe for a successful product:

"What's interesting is that companies don't necessarily see 3D's potential to reduce cycle time as a direct saving. Instead, they treat it as an opportunity to design more, and to fill the time they now have with creativity", says Avihay Feld, COO at Browzwear.

While a large element of getting concepts to consumers on time is certainly operational – the logistical elements of design, development and production – a significant part of the cycle is the creation of products that are trend-appropriate to begin with. And as Mary McFadden, Executive Director for CAD Product Management at Gerber Technology, explains, 3D allows retailers and brands to focus-test new products and proceed with only those they are confident will sell.

"As we have seen from the Gartner survey this year, new product categories are one of the primary methods companies are looking to leverage to increase revenue", says McFadden. "3D provides an opportunity to conduct early product testing with consumers, without the investment of full development. This opens all sorts of new opportunities."

It goes without saying that the creation of new products is both a creative activity and a labour-intensive one. To save on the latter, traditional methods of iterating

on old designs - or incorporating their components into new ones - involve the re-use of static, two-dimensional pattern elements, which Ram Sareen (Head Coach and Founder of 3D vendor Tukatech) believes is only the tip of the iceberg when it comes to accelerating the introduction of new products in 3D.

"Fabric properties, colourways, prints and drape can quickly and easily be altered without having to start from scratch every single time. It is one of the main advantages for developing new garments based on old samples, the only difference in the 3D process is, we get a running start", Sareen says. "Rather than having the 2D pattern blocks library, we now have 3D blocks and garments library, the designers can see on thumbnails all past products done and refer to an old style with change in measurements, fabric, colourways, prints and the users can just make a few clicks to get new sample based on new information within minutes."

As a project team considering an implementation of 3D, we could now be pretty confident in assembling a business case for the technology. We know we can build the right product, get it to market at the right time, and improve both fit and quality simultaneously. But anyone who read my first feature in this publication will know that this is not the end of the story: rather than being discarded, the 3D asset now takes on a valuable new life in the pages of online or offline product catalogues, or even on in-store smart displays.

"Fashion is roughly a \$1.3 trillion business, and product photography accounts for around \$10 billion in spending. Using 3D to replace some of that photography can reduce those costs to around 25% of their current state", says Landau, who adds that "these are huge savings we're talking about".

And traditional product and lifestyle photography is by no means the sole destination for that 3D garment - particularly when we consider that many 3D solutions offer the ability to pose and animate their avatars.

"There's almost no limit as to how marketing and sales professionals will be able to use those 3D assets in the future", says Gribbin. "Today, we look at them as replacing 2D images, but we need to think beyond that. Think of active sports where the body twists radically to one side and then the other, like tennis or golf or basketball. Why not use 3D animation to show the functionality of new fabrics or construction techniques in terms of enhancing comfort, performance, support, and still look great at the same time?"

Whether its overt (animated avatars on in-store displays) or camouflaged (staged 3D lifestyles shoots designed to simulate the real thing) placing virtual clothes on virtual bodies is about reaching consumers in a language they understand. Given the dramatic, quantifiable returns that can be expected from investing in 3D, it may be unnecessary to roll out an old adage to explain its value any further, but in this case a picture really does paint a thousand words.

The common visual language enabled by 3D working can also unite internal and external stakeholders (including suppliers) around a common goal, as well as serving as the foundation for a level of "unseen" ROI. These will be the developments that will come when experienced vendors and maverick inventors alike begin to experiment beyond the immediate-term.

"Like any technology investment, getting the most from 3D is contingent on having the right people working with it - people who can unify the art of fashion with a degree of technological expertise."

"Getting the full advantage out of 3D is a matter of working together and building out the full potential of what these solutions - carefully integrated - can do", says Sandra Gagnon, Senior Group Manager for Technical Development at Target. "If we consider, for example, how we might use a 3D garment where thread consumption is tied to the pattern, there are some hugely exciting opportunities to use that same asset to create a bill of materials and a bill of labour. I think the technology needs to catch up to the vision in that case, but the vision is definitely there."

During our interview, Gagnon actually touched on something I know has been a long-term dream of WhichPLM's CEO: a 3D asset with comprehensive value, bringing together aesthetic and commercial considerations, and allowing designers to predict bills of labour and materials within 5-10% accuracy before a single physical prototype is made.

This, of course, is just one suggestion. I firmly believe that the 3D canvas is so vast that a new generation of apparel professionals will use it to paint things that I and other analysts have never even imagined. But to get there, it's vital that educational establishments understand the extent to which 3D is already transforming the industry, and how far it will have

permeated by the time even this year's freshmen leave university and enter the workforce.

During my research for this feature, I asked a member of the WhichPLM editorial board who works in higher education in the United States to quickly survey a selection of different fashion students, expecting to receive some inspired suggestions for how 3D might be used differently. Instead, it emerged that almost none of the young people she spoke to had any hands-on experience of working with 3D, and indeed more than 75% were entirely unaware that there was a market where multiple different solutions - tailored for the needs of different product categories - compete.

This is another example (and WhichPLM has been exposed to several) of students being unprepared to enter the technology-led business of modern fashion. And while it certainly isn't endemic, since many universities have partnered with vendors of 3D solutions, there appears to be at least some gap between the industry's growing awareness and experience of 3D, and those of students currently in education.

As Feld puts it, "an actual handbag designer or fashion designer doesn't usually receive an education focused on 3D; what they know is the craft itself".

Like any technology investment, getting the most from 3D is contingent on having the right people working with it - people who can unify the art of fashion with a degree of technological expertise. So brands and retailers that do wish to target the kinds of savings and new opportunities listed here should take care not to assume that the next generation will automatically understand their vision.

Luckily, though, there's no shortage of concrete value to be found in 3D here and now. ■

Image provided by Human Solutions



AN EXECUTIVE BRIEFING ON 3D: SELLING THE VISION

AN EXPERIENCED IMPLEMENTER OF 3D AT THE EXECUTIVE LEVEL, DWAYN CATTO'S FIRST EDITORIAL FOR WHICHPLM TRANSLATES HIS EXPERIENCE OF TECHNOLOGICAL TRANSFORMATION INTO A SERIES OF GUIDELINES FOR BUSINESSES LOOKING TO INVEST IN INNOVATION. ALTHOUGH THIS EDITORIAL WAS WRITTEN WHILE DWAYN ACTED AS THE HEAD OF 3D AT A PRESTIGIOUS AMERICAN BRAND, HE IS NOW EMPLOYED BY A VENDOR OF 3D AND OTHER RFA TECHNOLOGIES, AND HIS EXPERIENCE OF BOTH ROLES LENDS THIS ARTICLE A UNIQUE PERSPECTIVE ON HOW TO SELL THE 3D VISION.



by
DWAYN CATTO

Today, a fashion business lives or dies according to its attitude towards technology.

Having worked in a senior I.T. role for one of America's best-loved luxury brands, I speak from experience. I've seen first-hand how successful executives have transformed their roles from steering the ship in generally the right direction, to actively participating in the selection, implementation and multi-year vision for innovative technologies.

I have also seen the flipside: brands and vertical retailers who let their digital strategies languish while they experienced prolonged period of profitability, only to realise afterwards, when revenues started to taper off, that they lacked the tools to grow any further.

Don't mistake my intention in writing this article; it's entirely possible for a new brand to flourish in the immediate term on vision and product alone. But eventually two things will occur.

The first: that brand will encounter a bottleneck in design, sampling, manufacturing, collection development or store planning – the exact hurdle is different for everyone – that cannot be loosened by throwing more resources at it. However profitable the business is at this stage, financial investment alone won't permit them to take the next step – at least not without sacrificing margins, lead times, fit, quality, or any number of other things that made them successful in the first place.

Their bottleneck is caused by the technologies they're using: conflicting Excel spreadsheets for collection development; PDFs dropped into Outlook for specification and supplier management. These tools are just not suited to the task at hand – and certainly not to the volumes that success and constant competition demand.

It's here that the successful executive reaches a realisation and, in most cases, weighs up the benefits of investing in PLM to replace his or her business's outdated tools. Hopefully they also use this opportunity to re-evaluate their methods, and to engage directly with the project team whose task is now to bring their technological capacity and process maturity in line with their competitors'.

The second of these two stages comes afterwards: core processes and the technical infrastructure on which they rest are as lean and efficient as they'd been envisioned when the PLM project began. And yet other brands (some, not all) are still pulling ahead: they're more profitable; they're seemingly able to better respond to their consumers; they've reduced spending on samples by millions of dollars per season.

The executive then asks herself why. And her answer will be that while she and her team looked at technology as a way of making existing tasks run more smoothly, their competitors were investing a step ahead of the immediate, figuring out how new tools might allow them to do new things.

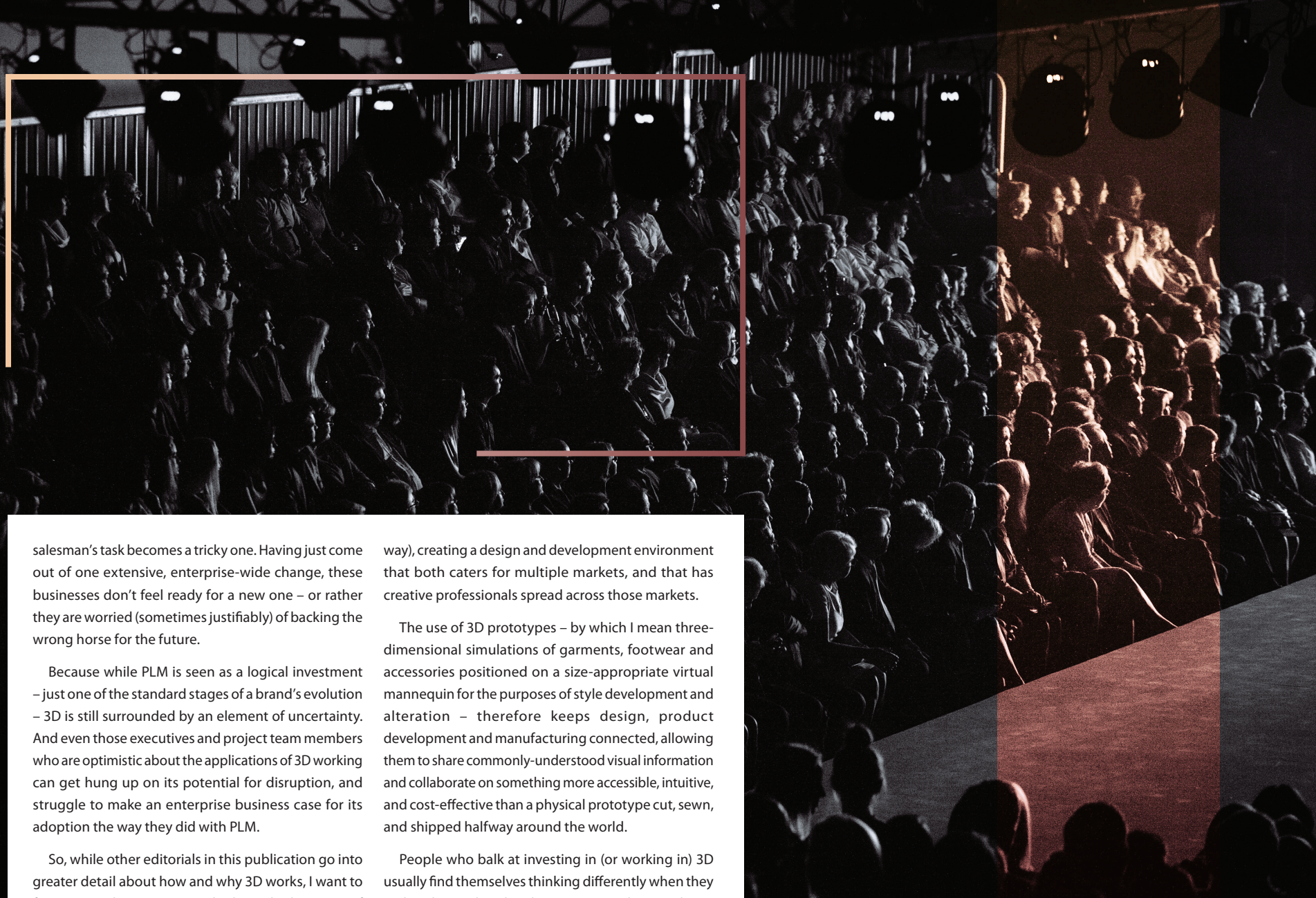
It's here that the two potential approaches to technology diverge: one focused on direct results, and the other potentially more speculative. And while the latter isn't always the right choice, operating a consumer-facing brand in today's fast-paced market occasionally requires leaders to look a little further than tomorrow's bottom line.

The case for 3D

When a given brand reaches the stage where 3D working can be beneficial, they're often in entirely the wrong mindset for actually making that deduction for themselves. After years of implementing PLM and potentially ERP – both tools that directly correlate with improvements to operational efficiency, data integrity and security – they find themselves with a conservative mindset. And although the benefits of working in 3D may be obvious – 3D prototyping having been proven multiple times over to cut product development and manufacturing costs – the risk can feel too great.

After all, is anyone else out there using 3D? The most competitive industries are usually those that guard their secrets the closest, and although a number of big names have achieved big success with 3D – some of them interviewed in this very publication – competitors typically only know that their rival suddenly has greater efficiency in design and development, not how they went about getting it.

As a result, these businesses and the people who run them – top to bottom – become risk-averse, and the 3D



salesman's task becomes a tricky one. Having just come out of one extensive, enterprise-wide change, these businesses don't feel ready for a new one – or rather they are worried (sometimes justifiably) of backing the wrong horse for the future.

Because while PLM is seen as a logical investment – just one of the standard stages of a brand's evolution – 3D is still surrounded by an element of uncertainty. And even those executives and project team members who are optimistic about the applications of 3D working can get hung up on its potential for disruption, and struggle to make an enterprise business case for its adoption the way they did with PLM.

So, while other editorials in this publication go into greater detail about how and why 3D works, I want to focus instead on assuaging doubt and relay some of my experience of the real applications of 3D in creating direct results across the traditional design and development cycles.

A thousand words

For all the acclaim 3D prototyping has gained for its process hacking potential – the ability to do entirely new things, and unlock heightened creativity – perhaps its greatest benefit to retail, apparel and fashion companies lies in its support for collaboration between pre-production teams using the universal language: the visual image.

With inspirations, designs and technical development all clearly and transparently understood, the brand that works in 3D from outset is able to make better decisions earlier in the development cycle than their counterparts who communicate through text and through flat sketches.

While this might seem relatively unimportant compared to the multi-million-dollar savings I wrote about earlier, remember that fashion is one of the most multinational industries there is. Most successful brands and retailers eventually look to go international (the best of them localising their product offering along the

way), creating a design and development environment that both caters for multiple markets, and that has creative professionals spread across those markets.

The use of 3D prototypes – by which I mean three-dimensional simulations of garments, footwear and accessories positioned on a size-appropriate virtual mannequin for the purposes of style development and alteration – therefore keeps design, product development and manufacturing connected, allowing them to share commonly-understood visual information and collaborate on something more accessible, intuitive, and cost-effective than a physical prototype cut, sewn, and shipped halfway around the world.

People who balk at investing in (or working in) 3D usually find themselves thinking differently when they realise that, rather than being a gimmick or academic exercise, 3D prototyping actually offers a tangible solution to one of the biggest challenges I.T. systems have faced over the last twenty years: how to seamlessly link design and product development with manufacturing.

Prototypes and people

Although the business benefits, properly couched, are compelling, one of the major considerations of a speculative (at least on the surface) investment like 3D is how people will take to it. Having read WhichPLM's previous publications and seen my share of PLM projects, I know that change management is a significant and often overlooked component of any technology-led transformation, and 3D is no different.

With their small production runs, financial constraints, and their slant towards the experimental and creative, luxury and ready-to-wear have proven to be ideal spaces for 3D prototyping to find favour with designers. Given the high aesthetic value assigned to these products, high-fidelity, shareable 3D prototypes represent a clear advantage over flat 2D sketches, allowing design teams to more clearly visualise concepts than they would through any other method.

"3D prototyping actually offers a tangible solution to one of the biggest challenges I.T. systems have faced over the last twenty years."

"Conflicting Excel spreadsheets for collection development; PDFs dropped into Outlook for specification and supplier management. These tools are just not suited to the task at hand – and certainly not to the volumes that success and constant competition demand."

To add to the attraction, designers who use proven 3D prototypes as the basis for product enhancements spend less time designing components that already exist. When as much as 75% of a product's cost is determined up-front, at the design stage, re-using 3D prototypes can be a major benefit in the creation of style variations.

Even the most jaded executive knows that happier, more productive designers create more inspired products that often reach the market more rapidly. But cycle time is not the only metric that matters when we consider the use of 3D prototypes over physical samples for development purposes. A brand might find, for example, that while cycle time remains static, working in 3D provides the opportunity for designers and product developers to leverage their common communication language to collaborate with manufacturers, refining product designs and improving product quality while reducing supply chain costs.

Similar to their use with designers, 3D prototypes help merchants to quickly and easily visualise, edit and compile individual product offerings into a cohesive product line well in advance of traditional methods. But it's the ability to use 3D prototypes to connect directly with consumers that should be the proverbial Holy Grail for merchants whose ongoing task it is to predict what consumers will buy – and at what price.

So while it may not be immediately apparent to an executive that working in 3D can be directly beneficial to their e-commerce strategy, as soon as those executives become more active participants in its evaluation, they should begin to realise that it holds the key to completely transforming their approach to consumer engagement.

Brand and vertical retailers with an online footprint can – and do – leverage convincing 3D prototypes to inform and influence consumer behaviours and their subsequent buying decisions.

This interaction can take place well in advance of traditional product launch dates, and reach a loyal audience through promotion on company websites and social media. Digital marketing teams can then build product narratives and marketing campaigns around these 3D prototypes – using the inspiration information contained in PLM to supplement the visual element – and either create them for a wide audience, or pursue a more tailored demographic.

Just as designers and product developers do internally, targeted consumers can then weigh-in

immediately on what they do and don't like – or offer key insights that might influence future sales before a product is even commercialised or mass produced.

So while 3D working won't immediately make your e-commerce storefront more profitable, it does have the potential to revitalise its purpose, creating a reciprocal online relationship between the brand and the consumer, and potentially altering the long-established paradigm of designing, developing and marketing fashion and consumer goods.

People and pace

Every fashion business – and every executive team, however hands on – deals with technology trends differently. And although the case for 3D is certainly strong, this doesn't mean that every brand, retailer and manufacturer should adopt it immediately.

Most brands and retailers should approach 3D gradually, with champions steadily selling the technological benefits internally in a way that aligns with their corporate objectives. Some, on the other hand, will leapfrog the proof-of-concept stage entirely and move directly to 3D prototyping to accelerate either the pace or the creative productivity of their design and development.

As with any other technology, 3D requires a considered, educated approach – one that will be different for every organisation.

But make no mistake, I believe an effective business case in support of 3D prototyping can be developed for most businesses, assuming their core processes are already mature, and supported by the right choice of PLM. Any link in the supply chain where a product image or physical sample is viewed or edited is an opportunity to instead use a 3D prototype, providing a competitive edge and enabling speed and internal economies of scale that can lead to direct – and dramatic – results.

For the executive with an appetite for innovation, the argument for 3D prototyping will soon become too strong to dismiss – just like PLM before it. And whether the business as a whole is receptive to another change or not, running a low-risk proof of concept and articulating your strategic vision for 3D now can help to lay the groundwork for an eventual corporate initiative focused on embracing the next digital revolution.

Regardless of how, where and when you tackle 3D, the key is to start soon – and start from the top. ■



by
BEN HANSON

IN WHICHPLM'S SECOND EXAMINATION OF 3D PRINTING, BEN HANSON LOOKS AT THE EXTENT TO WHICH ITS REVOLUTIONARY SPIRIT CAN BE ADAPTED TO MEET MORE PRESSING, PRACTICAL NEEDS, AS WELL AS HOW DIFFERENT APPROACHES TO NON-TRADITIONAL MANUFACTURE ARE REDEFINING DESIGN AND CREATION.

It's difficult to talk about 3D without addressing the spectre of 3D printing – the misunderstood technology that, depending on who you believe, is either a hobbyist gimmick or the fuel for a revolution in manufacture and intellectual property.

By producing a high-fidelity, reusable digital asset for design, development and selling, we open the door to sending that same asset – or a version adjusted for the purpose – to be manufactured digitally as well. And although 3D printing is not quite ready for large-scale industrial applications, much has changed since we featured a preliminary examination of the technology in our 2014 Annual Review.

In that publication, Kilara Le referred to the transition of 3D printing from a fringe interest to a viable industry as “amazing and rapid”; and the fact that 3D print bureaus have sprung to life in major cities around the world certainly supports her conclusion.

And although we don't yet live in a world where travellers can expect a 3D-printed holiday wardrobe waiting for them at their destination, the technology has established itself as both an outlet for boutique experimentation and a platform with compelling applications for corporations.

But what exactly is 3D printing? It can seem, at times, like magic, but the reality is actually fairly mundane. It's just the results that astound. WhichPLM (and the industry at large) has previously defined it as the transformation of three-dimensional digital models into physical objects, achieved through the progressive layering of material by a mechanised printer. This is what's referred to as “additive manufacturing” – literally adding horizontal slice on top of horizontal slice – and it works with a range of materials including thermoplastics, polymers, resins, powders and a host of others that vary depending on the printer type.

As I learned by researching the technology from a slightly different slant this year, though, there are also alternative approaches that still qualify as 3D printing in spirit, although they may not meet the letter of the law. A less formal definition would encompass both additive manufacturing and any other method – knitting, weaving, layering, spraying, or electrically guiding – of turning a raw material into a finished shape that has three dimensional properties.

To assemble this feature, I spoke with designers, inventors, software developers and technology vendors to get a better understanding of the true state of 3D printing for the retail, footwear and apparel industry. In the process, I discovered a field much wider than I expected in terms of applications, and certainly in terms of technological approach.

Avihay Feld (COO of Browzwear) shared his belief that a looser definition of 3D printing encompasses processes that have been in industrial use for some time. “3D printing of apparel actually already exists in unexpected places”, he says. “Circular knitting machines have advanced to the stage where they can almost produce a garment from scratch. That's not a 3D

printer as we know it, but it's important not to get too hung up on definitions when we're talking about a potential revolution. The 3D printer of the future that can create whole, seamless garments might not look even remotely similar to the ones we know today.”

In fact, inventors and designers are actively working to subvert the restrictions previously applied to 3D printing, and to create new ways of bringing traditional manufacturing processes into the third dimension.

Oluwaseyi Sosanya (a designer, engineer, and partner in augmented reality design startup Gravity Sketch) worked on a self-directed project called 3D Weaver, which applied age-old principles in a modern context. Sosanya's loom uses scaffolding to support thread that is built up layer by layer in a three-dimensional structure. The results can be durable (designed to withstand impact) or softer depending on the weave chosen, lending themselves to a range of different applications inside and outside fashion. Sosanya believes that despite a legacy of tradition, the weaving industry has the same appetite for innovation as any other.

“As crazy as this sounds, in a world where we can use an electron beam to create a replacement ribcage for a human being out of 3D printed titanium (as happened just weeks before this publication went to print) it still is not possible to print a complete garment.”

“What started as an experiment with single shaft looms and basic weaving eventually took me around Yorkshire, where I met people in different mills who were simultaneously making the traditional, high-quality fabrics for Burberry and Paul Smith, but also experimenting with new methods and new structures.”

Beyond the theoretical level, Sosanya used 3D Weaver to produce cushioned soles for a pair of running shoes – a traditional home for a resolutely non-traditional material. And footwear, as it happens, is actually a common avenue for experimentation. We should expect to see plenty of shoes (and hats and glasses) created in unorthodox ways as designers and manufacturers wrestle with the implications of new methods and new materials.

On the one hand this is due to the relatively discrete nature of a shoe, with simple parts sometimes joined together with little more than glue. But the choice to use footwear, eyewear and headwear as the vanguards

CREATING THE FUTURE: 3D PRINTING IN FASHION



Image provided by Audi.

of 3D printing is less a matter of choice, and more down to the inabilities of additive technologies to create soft fabrics.

“The introduction of 3D printing was originally envisioned as a way to augment physical samples, but that objective quickly changed”, says Susan Olivier, VP for Consumer Goods & Retail Industry Solutions at Dassault Systèmes. “The available substrates are still limited and most 3D printed models are less realistic than a good 3D model when it comes to representing apparel products, leathers and some of the sewn materials used in footwear.”

As crazy as this sounds, in a world where we can use an electron beam to create a replacement ribcage for a human being out of 3D printed titanium (as happened just weeks before this publication went to print) it still is not possible to print a complete garment – or at least not one made of what the RFA industry thinks of today as fabric.

“Eventually we will be able to print wearable garments. Today there are fantastic printed dresses that are wearable art” says Mary McFadden, Executive Director of CAD Product Management at Gerber Technology. “Once the material breakthroughs are made so that the printed garments are comfortable for daily use, the approach will be more practical.”

While the artistic applications of 3D printing are certainly striking (including Audi’s collaboration with designer Anouk Wipprecht to create interactive dresses inspired by its A4 automobile), they are not likely to meet any consumer’s definition of wearable. But neither are they intended to be, and luckily there are several different approaches being trialled to produce something more practical.

“There’s a lot research being conducted in this area, not to mention a number of startups” says Asaf Landau, CEO of Optitex. “I think that once we are able to cross the technology barrier and 3D print clothing the implications could be huge, but I think we’re looking at the next five to ten years rather than anything being right around the corner.”

As disappointing as that timeline may be, Landau is correct: there are, as I say, no shortage of people looking for ways to change the status quo.

Readers can turn to my first article in this publication (“A New Dimension”) to read about “generative design studio” Nervous System, who bent the rules by 3D printing a foldable dress made of thousands of interlocking triangles that look and behave like a sort of mesh fabric, moving with the wearer. But they are not alone in challenging the accepted wisdom that printing a T-shirt or a skirt is impossible.

I spoke with Aaron Rowley, a biomedical engineer and self-described activist, and one of the founders of fabric printing startup Electroloom.

“Essentials, rather than bespoke couture, may lead the charge when it comes to redefining the way products reach consumers.”

Aaron and his co-founders recently exceeded their crowdfunding goal for producing an alpha version of their eponymous 3D printer, which uses a technique called electrospinning or field guided fabrication (FGF) to produce recognisable single-piece basics like dresses, skirts and tank tops. FGF currently works by guiding a liquid polyester and cellulosic solution onto a predefined mould using electrical fields; the solution then coalesces around a mould to form a single, seamless piece of fabric.

“Additive manufacturing is capable of a lot, in terms of enabling new designs, but it has some distinct limitations in the types of materials it can use”, Rowley says. “We actually started experimenting with adopting



MONO eyewear collection, image provided by Edmond Wong, ITUM

traditional 3D printing methods, but we found that none of them were really suited to creating soft fabrics. This led us to develop our own technique, which is actually quite different from what people normally think of as 3D printing.”

Rowley also has some strong views on the social power of 3D printing and low-cost manufacture, which is a topic I cover at the end of this feature; but Electroloom is by no means the only company convinced that essentials rather than bespoke couture will lead the charge when it comes to redefining the way products reach consumers.

I also interviewed Shai Etzion, Head of Business Development at Tamicare – a manufacturing company located in WhichPLM’s home city of Manchester, UK, who believe their technology, Cosyflex, is “the world’s first technology developed to 3D print finished textile products”.

Like Electroloom, though, Cosyflex does not meet the traditional definition of 3D printing. Both employ a mould rather than printing freely, and in the case of Tamicare’s approach the solution is sprayed using a propellant, rather than being “printed” per se. Cosyflex, however, is an industrialised method, already proven in the medical field, and capable of creating a finished good in a matter of seconds rather than hours.

And although scale and industrialisation remains Etzion’s focus, he, too, recognises the potential of placing brand new tools in the hands of those who want to create:

“There’s a great deal of flexibility for design, when it comes to working with new materials: different polymers, different levels of flexibility, and even different scents that won’t fade with wash or wear”, he says. “Existing fabrics are all very similar, but 3D printing techniques really do create a new playground for designers.”

To test this theory, I spoke with five designers from around the world – each of whom is working with 3D printing techniques in their own unique

way, and whose reasons for using the technology vary as much as their creations do.

Edmond Wong is the owner of Hong Kong-based studio ITUM, which has collaborated with other brands on 3D printed jewellery and accessories, and recently passed its own crowdfunding target for MONO. MONO is a range of 3D printed glasses that lack a traditional hinge (the frame is printed as a single piece) and that, crucially, can be configured in several areas at the time of print to fit the customer’s face.

In Wong’s case, the decision to use 3D printing emerged from a personal need to find better fitting glasses in a style he liked.

“We can now create experimental products relatively cheaply, and then personalise them with essentially no additional cost”, he says. “Which raises the commercial question of what should be personalised. Shoes are an obvious choice since everybody’s feet are different, but I realised that glasses have the same problem but nowhere near the same level of flexibility. Every face is different - particularly between Western and Asian markets - so why should glasses not come in different sizes as well?”

As a glasses wearer myself, I find Wong’s project fascinating. With one ear a fraction higher than the other, I constantly have to bend my reading glasses into shape, or push them back up my nose. Adaptable sizing would solve this problem, but a traditional manufacturer is unlikely to have the supply chain agility required to create a pair to order for me.

Wong’s project may be small scale for now, but it strikes a nerve. With new technology comes the opportunity to define entirely new ways of working; not just tweaks to an existing workflow, but genuine transformations in what retailers and brands can actually offer consumers. Because either existing brands will learn to offer similar methods of customisation, or innovators will figure out how to scale their approach to manufacture, and will transform the industry with personalised products that have a demonstrable advantage over those the current market offers.



One key element of achieving that kind of scalability might be the ability to maintain margins by removing international shipping and logistics from the equation entirely – something Olivier refers to as “bringing manufacturing not only back on-shore, but to a store near you”.

Wong goes one step further in analysing the impact that consistent, error-free, automated manufacture might have on the established fashion supply chain:

“Logistics is one element of international manufacture, but another is craftsmanship”, he says. “With traditional methods, relocating production isn’t easy. In the case of glasses, some of the best frames come from Italy and Japan because there’s a legacy there: the end product is better than the equivalent from elsewhere because of manufacturing experience. So the issue of locality is a big one for brands that trade on quality. But with a 3D workflow, the craftsmanship is applied exclusively at the design stage; there’s no element of interpretation in the manufacture beyond the sophistication of the printer used.”

Someone who might disagree somewhat with that assessment is the second designer who provided me with their perspective: Zoe Dai, a Taiwanese footwear designer working in London, who applies her craft in pairing esoteric and traditional materials in a single shoe.

“The materials I used to 3D print the shoe platforms and heels were PLA, ABS and Nylon. For the shoe uppers I used cow leather. I mixed the two very different material components on purpose to get the benefit of both worlds. The artificial materials make my shoes sturdy and waterproof, whereas the leather part adds comfort.”

“Fashion may be forced to confront a world where its products are better made by machines than even the planet’s premier practitioners.”

Dai is keen to emphasise, though, that her dedication to the craft of unifying anatomical information and stylised aesthetics in a single piece is only made possible through the use of 3D.

“With 3D technology footwear and fashion designers can implement every complex idea; anything they imagine can get realised”, Dai says. “This allowed me as a designer to push the limits of design structures, and I could create designs that would normally be difficult or even impossible to produce with traditional manufacturing methods such as machining or moulding.”

This brings us to the slightly uncomfortable edge of 3D printing. Like any number of historical industries where mechanisation eventually superseded human capabilities, the fashion industry may eventually be forced to confront a world where its products are better made by machines than by even the planet’s premier practitioners.

The third designer I spoke with also embraced the idea of aesthetic standards that require 3D printing to realise. Based in New York City, where he leads the team behind Couture Fashion Week (now in its twenty-second season) Andres Aquino’s mythology-inspired headwear can be seen adorning this year’s features, and owe their complex shapes, the designer says, to being created in 3D.

Footwear collection by Zoe Dai, image provided by Zoe Dai.



Photo provided by Ron Carr, CoutureFashionWeek.com

“In the past certain parts and components of dresses and other garments have been done in 3D, but I wanted to approach something complete, which is how I settled on the idea of hats”, he says. “The concept I had in mind was to translate the principles of various mythologies into a collection of wearable symbols, all designed and made in 3D. Some of these would have been very tricky to realise using traditional methods, but 3D printing is much simpler for complex shapes - particularly when it comes to creating prototypes.”

And complexity is certainly something the watchmaking industry – itself steeped in a deep veneration of the extremely fine engineering involved in timepiece mechanisms - is familiar with. But non-traditional design and manufacturing methods have already begun to affect the way certain designers, like 4N brand owner François Quentin, approach their art.

“When it comes to 3D printing, I have been using the process of Stereolithography [a UV-guided additive manufacturing method] for many years to validate the shape of the cases”, says Quentin. “Regarding the movement, I made some pieces using the LIGA process. LIGA is a German acronym that stands for Lithography, Galvanoformung, Abformung (meaning Lithography, Electroplating and Molding). In other words, it is a manufacturing technology used to create high-aspect ratio microstructures. It is used when the piece is impossible to manufacture conventionally.”

And Quentin’s FashionLab stablemate, couturier Julien Fournié, is similarly interested in leveraging 3D technology to heighten his ambitions for quality and exclusivity:

“I revealed new accessories during my latest runway show in the official calendar of Haute Couture in Paris. These pieces were made using 3D printing with very specific and high quality finishes. They are complex pieces and it was impossible to make them without using 3D design and 3D print. They are meant to be exceptional and in limited edition only.”

“As a designer, what appeals to me is the idea of people having access to this kind of technology on a global scale, having more of a say in the products they like, and actually creating or customising those products themselves.”

This is one face of 3D printing: an unusual technology employed to create unusual things. High art and high-tech things that owe their very existence to the invention of novel ways of working, and to the unfettered creativity of their designers.

But there is another side to the 3D printing revolution – one that is already being used for viable industrial applications away from the world of catwalks and one-off luxury products.

I spoke with Hizmy Hassen, Chief Digital Officer for Industrial applications at Coats plc about his company’s approach to 3D printing for the purposes of prototyping zips, pullers and other similar components.

“Zips and pullers are prime areas for customisation”, Hassen says. “Brands want to tailor their size and shape, and stamp their logo on the visible face to lend a sense of identity to their products. To achieve this, historically suppliers needed to create a custom mould from the designer’s drawing, then undertake a minimum production run before handing the prototype back to the designer for approval. If it didn’t meet approval, they had to repeat the cycle - often more than once. Today, we use 3D printing coupled with our new online solution to speed up that process significantly.”

With the Coats solution, a designer can either sketch or take a photograph of a puller they like, then upload the image with an accompanying



"We weren't looking for a way to create the next fancy dress, but a new method of making basics. We want people to be able to express themselves with seamless tools."

description and use case, and Coats' own team will produce a prototype in either plastic or spin die-cast metal. And although the prototype will lack the strength of the finished product, it allows designers to save a great deal of time preparing for catwalks or photoshoots.

"Using our approach a designer can take something they've drawn or been inspired by and receive a 3D printed prototype much more quickly, meaning that the time-consuming aspect - moulding and mass production - only comes after approval, when the puller enters the bill of material and the bulk supply chain in the traditional way" says Hassen. "And as 3D printing becomes more cost effective and user friendly, those prototypes might even be printed directly at the designers' desk, slimming down a process that took weeks into one that potentially could take minutes."

While the industry is understandably focused on placing technology in the hands of people who can make use of it, it's important not to forget that fashion is built on innovation, and it would be churlish to imagine that all of that comes from established designers and big businesses.

When WhichPLM last covered 3D printing, in 2014, we highlighted the potential for what Kilara Le referred to as a "makers' revolution", or a levelling of the playing field, with equal access across established and emerging businesses to the tools that are being used to shape the modern consumer goods and retail markets.

This kind of industry shake-up may not appeal to everyone, but many of the people I interviewed for this feature found the prospect of a more egalitarian market intoxicating.

"As a designer, what appeals to me is the idea of people having access to this kind of technology on a global scale, having more of a say in the products they like, and actually creating or customising those products themselves" says Aquino. "Right now the price of 3D printing machinery

is high, but I expect that like any industry commercial printing will become cheaper as the domestic hardware becomes more accessible."

Aquino's vision places the designer front and centre, with 3D printing serving as the functional base for their experimentation. But Etzion envisions a slightly different world where, rather than requiring input from a creator, automated machinery will pick from predefined elements and materials and apply non-linear sizing rules to allow an end user to input a few key measurements in order to obtain a basic T-shirt made to order.

"I think in the future you're going to see vending machines in airports for people who forgot to pack their underwear or swimwear or socks", he says. "The machine will then print you those basics in exactly your size and your choice of colour. That's really the heart of where 3D printing is going to go: putting the production lines as close as possible to the end user."

But those end users who fall in between - not accredited couturiers, but nevertheless keen to have some design input into the styles they wear - may still be able to customise their own products and generate the files that are sent to a 3D printer, either at home or in the offices of a local print bureau.

Nervous System, for example, also host an open applet that allows users to design their own jewellery within certain parameters, and then export those results in a cross-compatible 3D print file format.

I find the prospect of a revolution in creativity interesting, because it mirrors the quiet coup that happened in retail over the last decade or so. Today anybody can open an e-commerce store, apply a margin to the products they source, process payments with relatively slim overheads and enjoy some degree of success. The barriers to being a retailer - physical square footage, geographical proximity to target market - have been all but eliminated by technology.

The same cannot, however, be said for creation. And I believe that exclusivity has been detrimental to the spirit of fashion. Today a designer can engage with the commercial world with little more than a trading name and a web host, but as the most cost-effective methods of production have shifted to gigantic manufacturing coordinators offshore (or prohibitively expensive local alternatives) the ability to actually make things has not been afforded the same openness.

This is something that Sosanya and the team behind Gravity Sketch sought to address.

"Our goal with Gravity Sketch is to democratise 3D creation. In some senses it's already fairly accessible, with domestic 3D printers and freely available CAD tools, but there's still only quite a narrow portion of the population who can create in 3D" he says. "Creating a 3D object should be as easy as sketching on paper, and we see augmented reality and virtualisation as the best method of achieving that goal."

Sosanya, it must be said, is something of a revolutionary, but that's by no means a unique quality in a generation raised on app stores and startups, where anything is possible provided you can obtain some seed money and then convince people to part with cash for the end result.

And while there's no shortage of successful companies that followed this method and came out the other side with something innovative and complex, some of the most successful ideas are arguably the simplest ones. For this reason, 3D printing may assume a more prominent place in the public consciousness not with bespoke products, but rather a better way to get the essentials.

"The ecosystem for textile design and development - particularly in apparel - is fairly closed, and one of the major benefits of 3D printing is that it really opens the doors for a lot of new people to start designing", says Rowley. "If you can create a method of 3D printing soft goods, then you can envision it moving beyond the couture and catwalk applications to a stage where individuals can print useful, practical garments for themselves. That was one of our major motivations; we weren't looking for a way to create the next fancy dress, but a new method of making basics. We want people to be able to express themselves with seamless tools."

Equipped with a new generation of tools, then, that degree of expression is something we might reasonably expect to see from a new and unexpected

generation of designers. Aquino, for example, spoke to me about being struck by inspiration and having only to walk a few blocks to find a print bureau who could make his dream come true. And while Aquino's hometown is one of the biggest cities in the Western world, I and several of the people I spoke with don't expect it to take long for the idea to proliferate and for print shops to open in more and more diverse locations.

"I expect to see more 3D printing bureaus open soon, and for competition to create a stronger market", says Wong, adding that, "this does raise ethical questions, though, since the confidentiality of 3D design files is extremely important for any company wishing to protect their intellectual property, and IP awareness - particularly in China - is low."

This, too, is something that WhichPLM has touched on before, but I'm personally extremely interested to see how the 3D printing revolution will affect the tenets of intellectual property - design rights and copyrights - in both the mass market and in other sectors where scarcity is part of the allure.

What happens, hypothetically speaking, when the 3D design file for an iconic piece of furniture or a work of modern sculpture is leaked by the 3D printing firm producing it? In a world where a single object print run is both feasible and cheap, what kind of rights management will stop an individual from stealing the digital blueprint for something they want and having it printed just around the corner?

"Fashion is one of very few industries where you cannot patent designs. It's almost impossible," said Feld when he and I mulled over this potential future. "Today you see a style being made by one brand, and the following month it's been adapted in two hundred different ways by manufacturers and other brands. But I don't see that as a threat to IP in the same way 3D printing can be in other areas. In fact that's how fashion evolves - through imitation and iteration. I see democratising manufacture in this way as an amazing revolution."

While I can't guess where that kind of upheaval might take the RFA industry, after speaking with such a range of different people in assembling these features, I can say with confidence that the revolutionaries will be in good company.

Readers with a 3D printer at home or local to them, are encouraged to try designing and printing their own jewellery at: <http://n-e-r-v-o-u-s.com/kinematicsHome/> ■





by
MARK HARROP

MEASURING PLM SUCCESS

WITH PLM NOW ENJOYING MAINSTREAM ADOPTION AND VENDORS PURSUING EXPANSION INTO NEW MARKETS AROUND THE WORLD, WHICHPLM CEO, MARK HARROP, CONSIDERS WHAT SUCCESS MEANS IN A BUOYANT INDUSTRY, AND SETS OUT HIS EXPECTATIONS FOR A FUTURE BUILT ON MUTUAL UNDERSTANDING, CLARITY, AND INDUSTRY-SPECIFIC COMPETENCE.

In our 2014 Annual Review, the WhichPLM analysis team defined PLM for retail, footwear and apparel as having reached a significant milestone. Borrowing a phrase from organisational theorist Geoffrey Moore, we wrote about PLM having “crossed the chasm”, or having passed the threshold that Moore believes disruptive products must in order to progress beyond enthusiastic early adopters and reach the mainstream market.

The market analysis included in the same publication supported our conclusion, demonstrating that PLM sales were growing significantly in volume in the middle and lower ends of the RFA market – sales of capable, modern PLM products to retailers and brands with annual turnovers of \$999 million or lower.

This kind of mass market adoption was unheard of when I began working with the precursors of PLM and extended PLM technologies, and it’s no secret that innovation (and iterative improvements to the PLM products themselves) has been instrumental in allowing PLM to bridge what Moore refers to as the “credibility gap”, or the difference between a product a few people love and one that everybody can believe in.

When we apply Moore’s theory to PLM for retail, footwear and apparel, the “few” were the early visionaries implementing highly customised, almost bespoke toolbox solutions, while the “everybody” is the mass market – the Tier 2 and Tier 3 organisations who took a pragmatic approach and only jumped on the PLM bandwagon when more adaptable, configurable solutions became available.

Moore talks about the creators of disruptive, innovative technologies (in our case PLM vendors) a great deal, placing a good share of the responsibility for crossing the chasm on their approach to product positioning, marketing, distribution and pricing.

And while I don’t mean to downplay the part that the developers of PLM have played in creating a strong, growing market for their solutions, one of the major catalysts for the explosion in PLM adoption over the last few years has been a behavioural one. Like a snowball gathering speed and mass as it rolls downhill, the success of PLM has benefitted immeasurably from those trailblazing early adopters: large businesses that took an early, often expensive, risk, and gave the rest of the market the opportunity to take a proven (although still potentially expensive) route to success by following in their footsteps.

These two reasons – better product and more confident customers – are, in my opinion, the reasons that PLM for fashion has been able to progress to the stage where, today, it’s widely considered to be of equal importance to ERP, perhaps the most significant investment that any brand or retailer will make in information technology.

I want to use this article to build on the conclusion we reached in last year’s Annual Review (and that is supported by this year’s data) and look at what mainstream adoption is likely to mean for PLM in the near and longer-term future, as well as what success means in relative terms for the vendors and customers who make up the market.

To do this, I’m going to start by looking backwards and giving readers an idea of just how far PLM technology has come, and how the RFA industry’s mindset and definition of PLM success has evolved alongside it.

“One of the major catalysts for the explosion in PLM adoption over the last few years has been a behavioural one.”

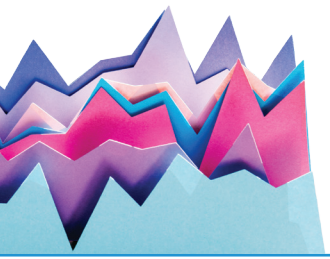
In the early 90s, a customer success story would have been a straightforward one. With the right user training and some careful installation, they would be up and running with what was then known as PDM (Product Data Management) in a matter of weeks, creating technical specifications (“tech packs”) in a dedicated software tool for the first time.

My experience with software for apparel actually goes back a little further than that. I recall a system developed by our team of manufacturing work-study engineers at Lawtex Ltd that gave management control of the sewing production progress – something we now consider to be part of the heightened visibility enabled by extended PLM.

It’s important we remember that, back then, success would not only be simpler to define, but also more limited in scope. The tech pack was then only seen and used by two or three departments within a typical apparel business: design, garment technologists, and quality assurance.

And because these departments worked within quite a strict set of parameters, each tech pack was relatively standardised, avoiding the need for the extensive configuration and customisation that came with later solutions. With fewer choices and fewer internal stakeholders, PDM success was far simpler to measure, and the return on investment (ROI) of buying into the solution was readily apparent.

Around the turn of the millennium, the industry’s needs began to evolve beyond what PDM was able to deliver. Although fully-fledged PLM was still not far off, a stopgap solution dubbed CPM (Collaborative Product Management) added simple collaboration and workflow functionality to the basic PDM engine, enabled by the commercialisation of the internet.



As I mentioned, CPM is remembered today as something of a transitional phase between PDM and PLM, and the latter superseded it quite rapidly, with the first true PLM implementations beginning around 2003.

Above and beyond the core processes supported by PDM and CPM, a PLM customer at this time could be said to have achieved success in their project when they and their chosen supplier had worked together to build a totally customised toolbox, tailored to their unique processes and ways of working.

As you can imagine, that sort of success is much harder to define than it would be with an out of the box solution producing tech packs for a small and manageable part of the business. A return on investment, in 2003, could only be measured in a binary way: whether or not the original design for a bespoke platform had been realised.

In reality, this rarely took place. Rife with customisation and bespoke development, toolbox implementations were lengthy and resource-intensive projects. The teams working on them had to keep pace with both technological limitations and then technological advances (which came thick and fast a decade ago), both of which could leave projects in a state of perpetual upgrading, with implementers attempting to roll out new features to meet the evolving needs of the customer's business.

The net result was that the majority of these PLM "toolbox" implementations morphed into completely unmanageable solutions, out of step with both technology and the requirements of their customers.

Success for the toolbox era was difficult to quantify at the time, but on reflection we can see how the development work undertaken by pioneering brands and software developers helped to pave the way for a new era of success despite ever-mounting increases in complexity and technological progress.

Today, success means something wholly different for PLM – it's no longer an extensive exercise in building your own solution, but rather a matter of finding the right enterprise partner to help secure the future of a huge range of different enterprise processes – more than 50 at my last count.

Befitting a solution that is considered the equal of ERP in importance, one of the strongest indicators of modern PLM success is its use as a backbone for the entire product development lifecycle and beyond, unifying end-to-end solutions from design to consumer and delivering a return on investment, compounded, at every stage. Success at this level also means the consolidation of most (if not all) of a customer's disconnected systems, and the establishment of the groundwork for new, extended opportunities such as 2D CAD, 3D CAD, CSR (Corporate Social Responsibility) and transparency, prints, knits, weaves, labour, lean/agile working and more. As I mentioned earlier: PLM is becoming far more complex!

Given that complexity, it almost goes without saying that this kind of success is not built on just the purchase or installation of software alone. An effective PLM project is characterised by partnership to a degree that not even the toolbox era was, with extensive consultation engagements taking place before software even enters the equation. Working alone or with an impartial advisor, a successful PLM customer incorporates their technological environment, long-term strategic objectives, and international

supply chain challenges into their roadmap for PLM, creating what I call a 360° implementation.

Given this shift in the definition of PLM success for end users, how has the way that vendors approach individual engagements and their market strategies for retail, footwear and apparel as a whole changed?

The simplest definition of success for a vendor (and the one we measure first of all in our market analysis) is new-name sales – new customers bring in new revenue, which in turn support future development and expansion. But securing these customer's names for their sales meetings isn't enough: in recognition of the long-term partnership prospect that a PLM project presents, vendors must also secure customer retention and loyalty; and in support of PLM's ability to unify and integrate disconnected systems, the vendor should also foster close relationships with critical third party solution vendors.

"By understanding how to define success for customers and vendors, we also begin to approach a measure for success for the industry as a whole."

Whilst almost impossible to quantify in a research-based publication like this one, enduring success (that which goes beyond the initial sale) comes from those companies that are continuously open to developing their solutions and adding further value to their PLM platforms, whether it's through their own additions or via seamless data sharing that will facilitate partner-driven initiatives.

By understanding how to define success for customers and vendors, we also begin to approach a measure for success for the industry as a whole – something that this publication covers in greater detail in the Market Analysis section, but something I nevertheless want to talk about here.

In the days of toolbox PLM, vendors and analysts fought an uphill struggle against a lack of knowledge. At that time, PLM was not known to the market, and implementations were so unique that it was difficult to explain how value could transfer from one to another. Today, with more advanced products and better-educated vendor and customer project teams, this is no longer the case. Thanks to educational outlets like WhichPLM, the average brand or retailer has at least a passing understanding of where PLM came from, and what it means in 2015.

These brands and retailers have seen PLM, properly implemented, deliver results for their peers, in either the Tier 1 or Tier 0 (otherwise known as the Super Tier: retailers with revenues of \$10 billion upwards) brackets, or further down, in the small to boutique end of the market.

What this diversity of customers means, though, is that the RFA PLM industry's greatest challenge now lies in reaching everybody, whether that's geographically (through the opening of new offices, and careful efforts to localise the concept, and source regional experts) or in terms of deployment methods (making PLM functionality available from the cloud, or on mobile devices with carefully chosen use cases).

"Ensuring that the industry continues to grow – rather than bubble and burst – will require mutual understanding between everyone."

When we state that PLM for fashion has crossed the chasm and achieved broad market adoption, it's important to realise that we don't mean to treat the entire market as one. Indeed, last year our market analysis revealed a fairly significant drop in PLM adoption from Tier 2 (which we call the mid-market with revenues between \$500 million and \$999 million). Was this a blip? Or indicative of a broader trend of PLM adoption being driven from the bottom up and top down, but not yet meeting in the middle? Turn to this year's Market Analysis to discover our latest take on this and other market sector trends.

Another method of defining PLM success will be its adaptability to different product categories (apparel fashion, ladieswear, menswear, childrenswear, footwear, accessories, hard goods, eyewear etc.) and its recognition of the differences in business models between brands, retailers and manufacturers. Often, a PLM vendor will claim that their solution supports footwear, eyewear, jewellery, accessories and garments out of the gate, when in fact only one or two of these have the required standardised processes and user experiences. To expand on this limited support, other categories will need to be bought (configured & customised) at an additional cost to the customer.

Cost, too, is likely to remain the primary barrier to PLM adoption until cost-effective cloud deployments are perfected. Although license costs have reduced across the board over time, more and more customers are recognising the value of proper preparation prior to ever buying these licenses – something that can be both time-consuming and expensive on its own. This kind of detailed introspection involves ROI analysis, process analysis, and planning – and as this year's customer survey results attest, a buoyant global market still includes a large number of customers who balk at the time and cost involved in 'doing PLM right'.

The role of vendors and analysts in this situation is to ensure that the difference between the right and wrong kinds of PLM projects are obvious, so that we can collectively work to avoid a repeat of historical dead-end development and mis-selling.

I don't want to temper enthusiasm here, since our figures suggest that the RFA market for PLM continues to grow rapidly. And as this publication's special focus on 3D shows, the data PLM contains and the processes it supports are now being picked up by solutions right the way from early consumer feedback and trend analysis, to marketing and corporate social responsibility, helping to pave the way for the future of a truly connected supply-chain.

Equally, though, we cannot pretend that mass-market adoption is all PLM needs in order to remain a success story on the whole.

WhichPLM's Supplier Evaluations (detailed analyses of key suppliers' businesses and solutions, freely available from our website) have, so far, awarded only one 4 star rating and no 5 star, perfect ratings. Functionally speaking, PLM still has a great deal of ground to cover in terms of process maturity.

So, success in the mass-market is a terrific thing, but as the new executive summaries in our market analysis section are designed to show, securing and interpreting this success means different things to different people, and ensuring that the industry continues to grow – rather than bubble and burst – will require mutual understanding between everyone: vendors, customers, analysts and educators. ■



SCANNING HORIZONS

A LONG-TIME ADVISOR TO THE WHICHPLM TEAM, CHRIS MCCANN HAS SPENT FIFTEEN YEARS WORKING TO DRIVE SUSTAINABILITY AND RESPONSIBLE SOURCING PROGRAMS. TODAY CHRIS HEADS UP RESILIENT. WORLD, A CONSULTANCY CREATING SOLUTIONS TO THE COMPLEX, COMMON CHALLENGES FACING THE RETAIL INDUSTRY AND HUMANITY AS A WHOLE. IN THIS EXCLUSIVE EDITORIAL, CHRIS ARTICULATES THE NEED FOR BRANDS, RETAILERS AND TECHNOLOGY VENDORS ALIKE TO LOOK BEYOND REPUTATION MANAGEMENT IN THEIR APPROACH TO SUSTAINABILITY.



by
CHRIS MCCANN

Just the facts, ma'am

In 2005 the Internet witnessed a new craze: Chuck Norris 'facts'. My son and his friends delighted in hunting down new and more outlandish statements regarding the prowess of the martial arts actor, sharing them with anyone they could corner:

"Hey Dad, did you know..."

- Fear of spiders is called arachnophobia, fear of tight spaces is called claustrophobia, and fear of Chuck Norris is just plain logic.
- Chuck Norris doesn't dial the wrong number; you pick up the wrong phone.
- When Chuck Norris enters a room, he doesn't turn the lights on, he turns the dark off."

There's a price to be paid for being a parent.

Information, it seems, has intrinsic worth - even if you didn't chuckle at those yourself, you can see how a group of eight year olds could be entertained by Chuck Norris factoids. And, with some imagination, it's clear that there can be 'gold in them thar hills'. Who would have thought a decade ago, for example, that video clips uploaded to Youtube of a man playing the game Minecraft would have any financial value? And yet Joseph Garrett's Stampy Cat is in the top 10 most viewed YouTube channels worldwide, has 1.7 million subscribers (one of them being my 7 year old daughter), and earns him a reported £246,000 per month.

History is replete with such examples, of people almost stumbling into fame and fortune after recognizing the value of seemingly innocuous data. Swiss engineer Georges de Mestral invented Velcro after noticing burrs clinging to his trousers while hiking in the mountains; Coca Cola was the result of a pharmacist's lab assistant accidentally mixing cocoa leaves and cola nuts with carbonated water; Percy Spencer developed the microwave oven after noticing the chocolate bar in his pocket melted when he walked in front of a magnetron. Of Facebook founder Mark Zuckerberg, Kevin Spacey (executive producer of The Social Network) notes:

"Mark was a geeky, socially awkward Harvard undergrad who wanted nothing more than to be cool. Using his computer skills by hacking into Harvard's computers, he pulled up the pictures of every girl on campus to create a sort of "hot-or-not" site exclusive to Harvard. Though the prank nearly got Mark kicked out of college, he and his friend Eduardo Saverin realised that they were on to something big, and thus the initial concept of Facebook was born."

From my own youth I recall the Magic Eye pictures - patterns of dots that, if you crossed your eyes, would slowly swim into focus to reveal a three dimensional image. An apt metaphor for the broader issue I want to discuss in this article. We're at a point in history when those who are able to recognise and act on some specific emerging trends - patterns of dots - who are able to make a leap of logic and utilise information seemingly unrelated to their industry or even stated expertise, have the chance of striking gold. People who, through accident or intuition, can separate the signal from the noise. Squint at the following few paragraphs, and ask yourself whether a picture begins to emerge.

"We're at a point in history when those who are able to recognise and act on some specific emerging trends - patterns of dots - who are able to make a leap of logic and utilise information seemingly unrelated to their industry or even stated expertise, have the chance of striking gold."

Known knowns

In the early 1990s, when Cuba was heavily dependent on oil imports from the Soviet Union, the collapse of the USSR devastated Cuba's economy. Exports nosedived, GDP plunged and oil supplies to Cuba halved. Buses couldn't run, and power cuts were frequent. Food imports dropped by 50% and fertilizers - products of the Haber-Bosch process - became unavailable. In very short order, the country became incapable of feeding itself, and the extent of its reliance on fossil fuels was laid bare - a strong signal coming out of the noise.

History records the response to that signal as "the Cuban miracle". Cubans survived the crisis by learning how to live with less oil. They had to learn to grow their own food, and all available land was pressed into service. Since chemicals and pesticides weren't available, food production was almost all organic. Before long, Havana was able to provide half of the city's food requirements from urban gardens. Through a programme of food rationing, land re-distribution, and community gardening, Cuba became self-sufficient within five years.



Humanity today is an oil-based civilisation: fossil fuels are woven into the very fabric of our societies, and in navigating our way through the daily ritual we give little thought to the depths upon which our dependency rests. As you read this, however, consider any article of clothing you may be wearing. Ponder on its provenance - its history, where and how it was manufactured. What role has energy played in each stage of its life cycle - in the ham sandwich the designer ate when creating the original sketch, in the fertilizer used to grow the cotton that formed the basic fabric of your shirt/ skirt/ patterned socks? For sure, energy was used in the cutting and making of the garment itself, but so too in heating the water for the worker's morning shower, and in the twenty-minute bus ride to the factory to start that day's shift.

Shipping 5,000 pieces from Ho Chi Minh to Highbury certainly requires vast amounts of energy, as does the packaging and labelling and finishing. And now, consider the following:

- That fossil fuels are a finite resource;
- That fuel prices historically trend upwards;
- Not that the most optimistic prediction of a global peak in oil production is circa 2030, nor that we've passed the most pessimistic prediction circa 2013. No, consider the fact that there is general recognition that a peak in oil production will actually occur someday, and consider the implications on the downward side of the oil production curve.

Resource depletion is one of a number of major, significant trends shaping the 21st century. Oil production in 33 out of 48 out countries has now peaked, including Kuwait, Russia and Mexico. Regarding water – literally the source of life - twenty-one of the world's thirty-seven largest aquifers - in locations from India and China to the United States and France - have passed their sustainability tipping points, meaning more water was removed from them than replaced in the past decade. Thirteen aquifers declined at rates that put them in the "most troubled" category, and research indicates that this is a long-term problem that's likely to worsen as reliance on aquifers grows.

As another example, China, which accounts for more than 90% of the world's rare earth supplies, has warned that the decline in its rare earth reserves in major mining areas is "accelerating", as most of the original resources are depleted. Other major trends include climate change and food security, and the impact of all these are exacerbated by population growth - an estimated 9 billion people on the planet by 2050, up from a current 6 billion.

These are 'known knowns', and according to former US Secretary of Defence Donald Rumsfeld this places us in a fortunate position. He famously said:

"Reports that say that something hasn't happened are always interesting to me, because as we know, there are known knowns; there are things we know we know. We also know there are known unknowns; that is to say we know there are some things we do not know. But there are

also unknown unknowns – the ones we don't know we don't know. And if one looks throughout the history of our country and other free countries, it is the latter category that tend to be the difficult ones." (Emphasis added)

As an industry, we already have a fairly clear picture of the challenges we're facing. What's stopping us from acting?

Tree huggers, greenwash, and spin.

For so long, the retail sector's prevailing view of sustainability has been that of a niche issue, difficult to monetise (either as profit or cost), and at best to be managed as a reputational consideration. The fundamental driver, however, has been completely wrong. The argument has often been that if consumers were to vote with their feet, adopting and promoting sustainable products, the market would respond accordingly. In reality, Gallup polls conducted over the past 10 years have consistently shown a majority of consumers (a year on year average of 61%) are very concerned about sustainability issues. Despite this concern, consumers are typically constrained by limited incomes and limited choice – an inability to see the full picture - and so retailers themselves are also presented with an imperfect view.

Unsurprising, then, that service providers such as PLM companies have in turn not received strong signals from potential clients, and that the various ethical and environmental concerns that make up "corporate social responsibility" are only recently becoming recognised as priorities for software development. Nevertheless, the trends described above (resource depletion et al) now promise to capture the attention of retailers in a manner they understand very well indeed – one that eclipses even consumer concerns.

In the starkest possible sense: resource depletion threatens to increase costs, and slim down already thin margins. Climate change and issues of food security are already having an impact on individuals and communities where products and commodities are manufactured and grown. And the growing trend towards disintermediation by retailers, the reduction in the use of intermediaries between producers and the retailers themselves as a means of further eliminating cost, brings issues faced by those communities into sharp relief.

In some cases, retailers are beginning to recognise that if these issues are not managed effectively then there will most certainly be an impact on operational effectiveness. For example, the growing trend of smallholder farmers' (e.g. as cotton producers) children who are leaving farming for arguably more stable lives in cities, coupled with the increasing age of farmers themselves, threatens continuity of supply 10 or 15 years in the future. And this is only one of a range of challenges to be addressed, whose root causes need to be understood.

This is the picture that emerges when we examine the status quo of retail and brand operations today. But like Zuckerberg and other opportunists, can we also find value in acting on that knowledge?

"In the starkest possible sense: resource depletion threatens to increase costs, and slim down already thin margins."

Fortune favours the bold

The World Health Organisation estimates the value of the global pharmaceutical industry to be circa \$300 billion, rising to \$400 billion in the next 3 years. Quite incredible, given that modern medicine literally 'grew' out of an unwashed petri dish on Sept. 3 1928. On that day Scottish biologist Alexander Fleming returned to his lab to find a strange fungus on a culture he had left in his lab - a fungus that had killed off all surrounding bacteria in the culture. If a modern Emperor's ransom can arise from happenstance - a convergence of accidental events whose genesis would have been overlooked by anyone with lesser skills than Fleming - how much greater is the possibility of success arising from wilful application of proven technology to known issues?

Talking to my oldest daughter recently, she expressed the view that 'this climate change thing will all be ok' because 'they'll fix it'. I hold a similar view: I'm optimistic that technology plays a significant role in future solutions, that we can adapt and indeed thrive. I also believe that the 'they', however, is 'us' and that the 'fix' must come from industries taking a proactive stance. In the 20 years I've spent in the retail sector (a significant portion of which has been in apparel and with PLM technologies) I've often wondered why it is that Product Lifecycle Management tools have not been developed to take advantage of the opportunities that seem to be apparent.

In U.S criminal law, means, motive, and opportunity is a common summation of the three aspects of a crime that must be established before guilt can be determined in criminal proceeding. Similarly, in understanding the growing challenges described above (motive), and the sophistication of existing technologies (means), shouldn't the presence of a final element (opportunity) propel PLM providers into the development of sustainability functionality? Fortunately, recent conversations that I and the WhichPLM team have had with software suppliers suggests that the opportunity is beginning to present itself for precisely that type of functionality to be developed. And, as history has so often demonstrated, fortune may be about to favour the bold – the vendor who develops the tools, and the brand who uses them to repair potential rifts in the fabric of their international operations.

WAGJLL (What A Good Job Looks Like)

To date, the retail industry has adopted a 'Compliance Based' approach to the social and environmental challenges that emerge from contemporary supply chains. The industry fixes the visible cracks in the dam; it passes a cursory inspection, and everybody moves on until the next leak emerges and the dance is repeated. In my work with Fortune 500 companies, government and non-governmental organisations, if there's been one constant it's that a solely compliance based approach to complex issues does not work.

Still, though, that kind of reactive approach is what many retail programmes are focused on. And while I certainly don't advocate eliminating these programmes, it's important that both PLM customers and PLM providers realise that compliance audits and guidelines – the

most popular currency for 'measuring' sustainability - are the equivalent of taking one's temperature using a (more, or less, sophisticated) thermometer. Whether by plastic strip, mercury rods, or digital readings the outcome is the same- the thermometer highlights the problem once it already exists. And likewise, the audit reveals the symptoms, but rarely addresses the cause. Service providers (i.e. PLM vendors) who are able to move past such an approach (which, we must recognise, typically adds cost to their client) and focus on addressing what are increasingly business critical issues (adding value) will be feted. It is that simple. And from what I can see, the early adopter who is able to articulate not only problem but also solution will be in high demand.

The Sustainable Apparel Coalition (SAC) in the US represents a third of the global market share of footwear and apparel retailers and advocates this kind of approach. In their own words, as stated on their website:

"The Coalition's vision is an apparel and footwear industry that produces no unnecessary environmental harm and has a positive impact on the people and communities associated with its activities."

And there's the opportunity we discussed above - 1 in 3 of the world's apparel and footwear retailers are signed up to addressing social and environmental challenges. If that isn't a signal for PLM vendors to seriously consider developing appropriate technology then what is?

Clearly, although still in the early stages of development, Higg offers a degree of sophistication which steps beyond the more traditional compliance approach. And yes, there is so much more that can be developed - for example, existing PLM functionality can clearly be utilised to further the SAC's stated mission as well as catering for other sets of guidelines, regulations, legislation and private standards. And this is all without mentioning that PLM itself is an ideal vehicle to deliver both present and future tools. Carbon footprints, supply chain transparency, purchasing practices, impact assessments, 'what ifs' - the list is a long one.

To underscore the untapped potential of PLM to help transform the way things are done today: WhichPLM interviewed a number of brands, retailers and manufacturers currently using PLM, and although a small portion of them had some established ethical and environmental CSR-like functionality in their current solution, the majority that did not represent a significant potential market for PLM vendors.

In considering the title of this article, I settled on 'Scanning Horizons' because I wanted to emphasise exactly that point. Sometimes when we're in the trenches, head down, designing next season's collection to a strict deadline, it can be difficult to remember the importance of lifting our gaze. In doing so, what becomes apparent is that it is not only effort but also direction of travel combined which brings the rewards. Sometimes we have to stop and look at where we're going, instead of just responding to the bumps in the road. I believe we're at a point today where means, motive and opportunity have converged to enable PLM vendors to add new and very real value to their retail clients, provided they are creative and bold enough to look to the horizon. ■

Building the Tools for Transparency



by
CAMERON CHILDS

IN THE FIRST COLLABORATION BETWEEN WHICHPLM AND THE SUSTAINABLE APPAREL COALITION, PRODUCT MANAGER CAMERON CHILDS TELLS THE STORY BEHIND HER ORGANISATION'S HIGG INDEX, AND LOOKS AT THE UNION OF PROACTIVITY AND TECHNOLOGY THAT WILL CREATE THE FUTURE OF TRUE SUPPLY CHAIN TRANSPARENCY.

Today, the average brand and retailer acknowledges the importance of sustainable manufacturing, transparent supply chains, and fair labour practices. Small businesses and multinational corporations alike have their environmental and ethical standards emblazoned on marketing materials online and in-store, under the banner of "corporate social responsibility" or CSR. And as a shopper you'll recognise the watchwords: recycled packaging; locally sourced ingredients; Fairtrade food; codes of conduct; no sweatshops.

But this wasn't always the case, and I want to use this article to talk first about the changes in consumer behaviour and international awareness that led a small group of retailers and brands to found the Sustainable Apparel Coalition.

Hot on the heels of well-documented, mid-90s public image catastrophes and the very real, very human tragedies behind them, business-to-consumer organisations in every industry were forced to examine their global sourcing and selling processes.

Broadly speaking, the simplest – at least in the eyes of the consumer – supply chains came first. The cycle of growing a bunch of bananas, shipping them across continents, and then packaging them for grocery store shelves is quite readily understood, for example. It involves a clearly-defined producer, an element of logistics, and a simple product whose quality and provenance should, in theory, be simple to track down.

A lot of the same language and principles apply to the apparel, footwear and accessories industries, but the end products are anything but simple – and indeed most consumers have little or no idea of the complex chain of materials, labour and logistics that go into making a single style. Where a banana is grown, picked,

treated, shipped and sold, even something as straightforward as a polo shirt must have its constituent cotton grown, picked, treated, shipped, spun, shipped again, dyed, shipped again, and matched with appropriate thread and buttons (which have undergone their own sourcing process) before being shipped a further time, sewn, assembled, shipped in sample form to brand headquarters, rebuilt according to revised specifications, before finally being mass produced and shipped a final time to markets around the world.

That is probably an exhausting sentence to read, but it demonstrates some of the complexity that companies in the fashion industry faced when they began attempting to understand precisely who was making their products, where, and out of what.

To complicate matters further in recent years, these brands and retailers now seldom deal directly with their suppliers; consumer demand and fast fashion have led to the massive expansion of multinational manufacturing coordinators. These are the names that appear on bills of material and labour, and on factory audits – companies that operate across tens of thousands of factories, pairing suppliers with brands quickly, but making insight a tricky thing to achieve.

So, to understand the climate in which the Sustainable Apparel Coalition (or SAC, the apparel, footwear and home textile industry's foremost alliance for sustainable production) was formed, it's important to understand not just why retailers and brands need transparency, but what that transparency actually means in a contemporary fashion supply chain.

The easiest way to picture a transparent supply chain is to do away with the "chain" concept entirely: visualise the various producers, manufacturers, agents and other middle-men that together turn sketches and technical specifications into finished products not as a series of opaque metal links, but as a long translucent tube. An overseer can then, in theory, select any stage of the global product lifecycle and see – without interference or interpretation – what work is being done, where, by whom, and using what resources.

Retail and brand leaders know from experience, though, that this level of insight is difficult to achieve –

"It's important to understand not just why retailers and brands need transparency, but what that transparency actually means in a contemporary fashion supply chain."

particularly when the more immediate challenge in CSR remains the management of public perception and the avoidance of negative association between the parent brand and ongoing ethical and environmental crises.

The principle barrier to actually realising that transparent tube – a lack of insight into who is actually fulfilling orders – is also the primary reason that Western brands are still being blindsided by media coverage that places their products in the hands of mistreated workers or, worse, at the scene of factories and lives destroyed by wholly preventable disasters.

Without end to end transparency and a radical approach to sustainability, the retailer or brand who commissioned an order may never even have known which factory was fulfilling it, or that, in some cases, the factory was subcontracting large jobs to other factories, or even to machinists working at home, alone.

Suddenly presented with this kind of negative exposure, brands can almost be forgiven for kneejerk reactions. After all, the decision was never technically taken to work with a factory that fell short of their standards for conduct, but it happened anyway – in about the most public fashion possible.

These situations were, sadly, commonplace prior to 2009 – when the SAC was formed – and still occur today. Although the word “sustainable” is often borrowed for purely environmental applications (harvesting, fishing and the like) the founding members of the SAC chose to see it as a method of separating international operations that could thrive in a future of heightened moral and regulatory scrutiny from those that couldn’t.

This level of scrutiny is what historically gave rise to the face of CSR for fashion that most consumers are familiar with – an isolationist, “us and them” mindset, with brands so busy fighting to keep their names away from the symptoms in the headlines that proactive, meaningful change to the root causes was impossible.

This was the world that the founding members of the SAC sought to change, by encouraging brands and retailers to set aside their instinctive, kneejerk reactions and personal agendas, and to consider what could be done to actually fix the problem in a world where good intentions and individual processes were not cutting it.

Founded as a non-profit association, the SAC was built on the principle that changing this paradigm was too large a task for even the biggest single corporation. It required a sustainability-first approach with mutual buy-in from multiple product sectors and different geographies: a shift in thinking from “where can I make my products the cheapest?” to “how can the apparel industry embrace a set of collective values and have a positive impact on the people and communities associated with its activities?”.

Our founding circle members – Adidas, Nordstrom, Target, Li & Fung, TAL Group, Verite and Nike – recognised that the only way to achieve this lofty goal was through proactivity, collaboration, and the establishment of a toolset for transparency.

The toolset was, and remains, particularly important, since the SAC was founded at a time when governments seemed poised to impose their own definitions of sustainability and policies to enforce corporate responsibility – ones that might lack the insight and considerations that a body of experienced brands and retailers could provide.

As we saw it, a stable, sustainable and mutually beneficial channel between people who buy clothes and people who make them had to be one defined by choice and collective ethics, rather than remaining an exercise in minimising individual responsibility.

As the WhichPLM team know from experience, gathering competitors – typically at one another’s throats in the open market, competing for the same consumers – takes time. The collaborative effort that this publication’s customer survey, market analysis and vendor listings represent did not happen overnight – and no doubt the reaction we received from potential members in the early stages will have been mirrored over the year’s in WhichPLM’s effort to create a more transparent market.

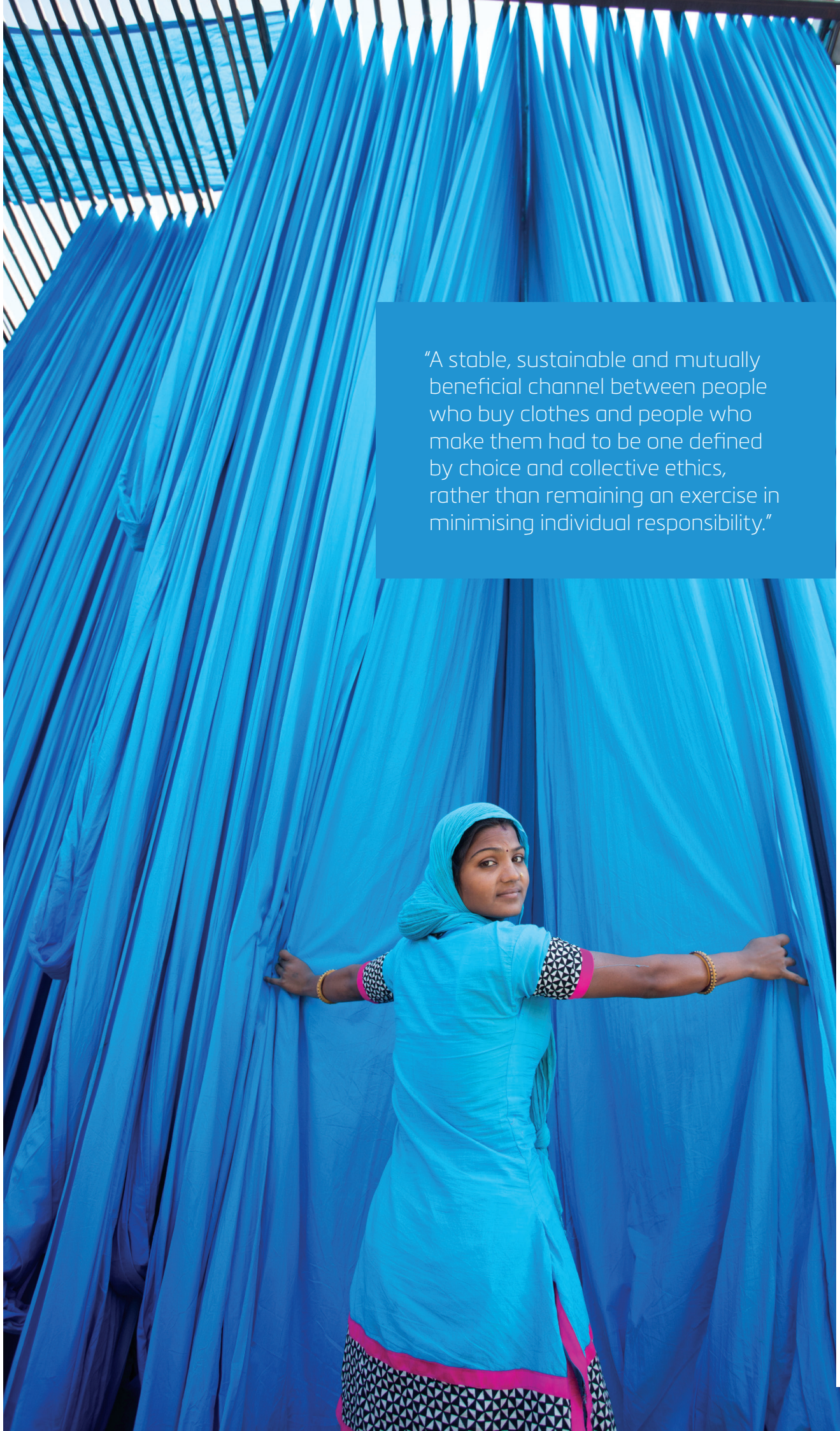
In founding the SAC, we recognised that any meaningful toolset and standard would require companies to ask and answer tougher questions than they were accustomed to and, eventually, to face demands from their competitors to share what they had learned – something we encouraged under the spirit of what was then called “pre-competitive” collaboration. As one of our founders put it at the time, “why share business intelligence with a rival?”.

The answer to that question should by now be apparent. Despite a long history of competition, brands and retailers recognised the need to break the cycle of reactivity, and to create industry-wide tools to better manage the criteria that really counted.

Building on what was called the Nike Considered Index, the SAC established the Higg Index: a suite of tools designed to allow fashion users – from factor managers to designers and sourcing teams – to drive meaningful change in their methods, and to minimise their negative impact on workers and ecosystems worldwide.

We launched the first version of the Higg Index in 2012, and our members have worked to iterate on the tool ever since, helping hundreds of companies to identify opportunities across the sustainability spectrum, from improvement in energy use and resource conservation, to less toxic textile processes, to better workplace conditions and many more metrics.

Today the Higg Index is widely available in Excel format, and is used by more than 80% of our members to make proactive decisions about the way their products are made; where; and by whom. They use it to supplement existing audit procedures, as a way of measuring the energy use, greenhouse gas emissions, water consumption, chemical use and waste of their factories around the world.



“A stable, sustainable and mutually beneficial channel between people who buy clothes and people who make them had to be one defined by choice and collective ethics, rather than remaining an exercise in minimising individual responsibility.”

Along the way, the Higg Index has also emerged at the forefront of a broader discussion about the interaction between sustainability guidelines, programmes, legislation and technology. Although our index is geared around proactivity in key compliance criteria, it (and other methods of measurement) also have the knock-on effect of reducing risk and generating greater efficiency in supplier management, manufacturing, and even marketing processes.

This reflects a wider shift in retailers and brands’ understanding of transparency and sustainability themselves. A proactive transformation on this scale is one that will inevitably impact a business in the same way as other enterprise-wide projects like PLM, and one that requires the same consideration as to how core business activities can be supported and enhanced through technology.

A number of supply chain management solutions already exist in the market, created by well-intentioned vendors who aim – as the SAC does – to bridge the gap between the level of supply chain insight retailers and brands need, and the kind they can currently access.

Many of these tools are rightly considered part of the extended-PLM ecosystem already, and are either integrated into PLM, or are competing with modules that are in development by PLM vendors keen to codify criteria for sustainable, ethical, and environmentally sound product development into their sourcing, costing and supplier management tools.

There is little question that the right technology can help brands and retailers to unlock new levels of transparency, and indeed SAC representatives (myself included) have already begun to speak at industry events, and to talk with PLM and extended-PLM developers about how to drive these opportunities further.

Our goal remains to create significant changes to the status quo of apparel production, and I personally believe that this will become a more accessible aim when it (and other sustainability tools and guidelines) are integrated with the pre-eminent product development solutions. My hope is that PLM customers and PLM suppliers alike will continue to embrace the concept of proactive transparency and sustainability as yet another method for self-improvement – one that sits alongside initiatives like 3D prototyping that are featured in this publication.

Although the SAC works only with apparel today, we are pursuing that kind of development, looking to create indices for other product categories (footwear, accessories) that can equally become part of the right modules and solutions from the right technology vendors. Working with WhichPLM, we aim to create a platform for discussion; not just with fashion businesses seeking a way to do things a little differently, but with the technology developers who can help grow a true toolset for transparency.

Find out more at www.apparelcoalition.org or read Chris McCann’s article in this publication for a different perspective on modern corporate social responsibility. ■

TRANSLATING TRENDS INTO PROFITS



by
JAANA JÄTYRI

TRENDSTOP CEO JAANA JÄTYRI EXAMINES WHY TREND CONSCIOUS PRODUCT EXECUTION IS A NECESSITY FOR FASHION AND LIFESTYLE RETAIL SUCCESS, ALONG WITH THE OPPORTUNITIES AND CHALLENGES IN TRANSLATING TRENDS INTO PROFITS.

TRENDSTOP WORKS WITH LEADING RETAILERS AND BRANDS TO TRANSLATE TREND CONCEPTS INTO COMMERCIALY PROFITABLE PRODUCTS FOR THEIR SPECIFIC TARGET AUDIENCE. THEY HELP EACH CLIENT NOT ONLY TO HAVE THE RIGHT OFFER IN STORE, BUT HAVE THE RIGHT OFFER TAILORED TO SUIT THEIR CONSUMER IN KEY MARKETS.

Today there are many advanced and effective PLM systems to choose from, all targeted at increasing efficiency and improving product development processes. It goes without saying that a critical part of the process is ensuring the right product concepts are being fed into the system for development. If you are not developing the right products for the target audience, your highly optimised processes may just be accelerating you towards increasing losses, rather than increased profits.

We've all seen the new collection arrive on the retail floor, and thought 'wow', that's either all wrong, or all right. And you wonder, how the

collection that is not all right managed to make it to this stage of the process? Yes, it's on time. Yes, it's been priced on budget. It's in the stores when it's supposed to, the marketing is out there... But, is it going to sell?

If buying and product development are not in line with what the consumer actually wants to buy, then this will lead to discounting at retail. It is easy to see the product is not right when the sales figures come in, but what can businesses do to identify the right products to buy or develop earlier in the process?

Way before the product hits the store, how do you confirm that you are on track with the right product development? How do you recognise you are veering off course, and when do you realise you may be missing the target? How do you track missed opportunities and plan for avoiding them? No matter how good your systems for developing product, the key is having the right product concepts and key items available to feed into these systems.

Each company is different, with a different target consumer. Today's complex and well-catered for consumer can be hard to please. They want the latest trend, great value for money, amazing quality, beautiful design, to save the planet, and not have their products made by children. In short, today's consumer wants it all, and

they want it now. The modern consumer is well informed about trends, brands, quality and value. They know what they want, and they are spoilt for choice in today's saturated marketplace. Responding to this intelligent consumer is a complex balance where one wrong move in the process can cause profits to suffer.

In my past 15 years working with and calibrating the product execution at leading brands and retailers, I know there are three parts to the process of getting the product execution right. In simple terms these are: 1) Target

"No matter how good your systems for developing product, the key is having the right product concepts and key items available to feed into these systems."

audience understanding; 2) Seasonal consumer mindset understanding; and 3) Applying these to the most appropriate product execution.

People often ask me, what is the most important trend for next year? Many seem to think that knowing that one big money maker will be the key to a successful season. More recently, with the number of intakes increasing in retail, this question is asked in plural, 'What are the most important trends coming in for next year?' This simple question alone is indicative of the misconception around trend execution.

Yes, we need to know what the season's most important trends are, but that alone is not enough. An equally important question to ask is whether that trend is right for the target audience? And relatively few people have been asking that question. A specific answer to the question 'what are the most important trends for next year' depends on the target audience and the end customer, as there are multiple macro trends simultaneously influencing different market levels. So, the right question to ask would be 'What are the right trends for our customer?'

Brands and retailers need to establish a sense of identity that is season relevant in the consumer's mind in a saturated retail market. At Trendstop, working with major brands and retailers, we find this a common issue,

made more complex by today's global and complex consumer. People ask us, how can we target the UK market better? Or the U.S. market? Or the Chinese market?

This raises another question, how well retailers and brands actually know their customer. In today's age of modern technology, social media and instant communication, all the tools certainly have been given to businesses to get to know and to understand their customer intimately. In many cases, it is a question of not having enough data, but where to start? Even when the business has vast amounts of customer, sales, trend and social media data at its disposal, any data is only as good as the analysis applied to extract meaning out of it. (How many executives do you know who were too busy to analyse this data and delegated the task to a junior?) Perhaps the decision that resulted in lacklustre sales on that seasonal item was initiated by a junior making a poorly informed item selection in a hurry?

Once the target audience and the season's most important product directions are known, only then will it be possible to identify which product development direction is right for your business. Let's assume that we have identified the most relevant Top 3 or Top 5 product items for a particular business. The next issue to overcome is market saturation, as the same items will be sold by hundreds of brands and retailers. The winning product executions will be the best sellers within their price level. If your company's Top 3 products are the 79th best executed versions from 100 brands or retailers, then at least 78 consumers out of 100 are more likely to choose one of the other, better executed products. And, the majority of consumers would choose one of the top 20 best executed items available in their area and within their budget.

At Trendstop, we use a unique method of data analysis, which gives clients a rounded and reliable 360 degree overview of the consumer, the competition and the market opportunities. This makes it much easier to have the right product in the right place at the right time. Our ongoing trend validation service identifies new opportunities and emerging trends and proposes updates to existing products and basic lines over time as the consumer mindset evolves. And the more the consumer, and what she or he wants is understood, the easier it will be to translate trends into profits. ■

2015 PLM customer survey

THE DEGREE TO WHICH RETAILERS, BRANDS AND MANUFACTURERS AROUND THE WORLD HAVE PARTICIPATED IN OUR PREVIOUS PLM CUSTOMER SURVEYS HAS BEEN HUMBLING.

Over the course of the last five years our team has been provided with the data that allowed us to present a truly unbiased picture of PLM for retail, footwear and apparel, built on the opinions of real end users.

With any annual data collection exercise, though, a point is eventually reached where certain conclusions are repeated year on year, and where new opportunities emerge to vary the nature and scope of the questions asked, presenting more straightforward opportunities to participants without compromising the survey's original intent.

So, to coincide with the other changes to this WhichPLM publication, we took the opportunity to bring our customer survey up to date – as well as including some additional questions specifically designed to discuss the current real-world role of 3D in the modern RFA industry.

Although some questions have been removed entirely (particularly those where responses had remained consistent for several years) and others rephrased, we have taken care to retain those data

points that will allow us to draw important conclusions and track trends between these responses and those seen in our previous, annual publications. For example, fashion industry experience has invariably been cited as a major criterion in vendor selection, so rather than ask for this information again, we instead focused on the strain this and other selection criteria are placing on a limited and dwindling pool of fashion-experienced vendor resources.

Many questions have been re-tooled in this way: designed to elicit responses that will add additional layers to the conclusions that past surveys have demonstrated are concrete. To this end, we have also removed more ambiguous options in the interests of reducing the uncertain responses we have sometimes received in previous years.

In these and other respects, this survey should be considered an evolution of the basis we have presented between 2010 and 2014 – one that mirrors the transformations the industry itself has undergone.

Like all of the changes to this print publication, this evolution is designed to serve our consistent aim of reaching the most insightful, impartial conclusions possible about PLM for retail, footwear and apparel.

EXECUTIVE SUMMARY

PLM for retail, footwear and apparel has never been more popular. In our 2014 Annual Review we documented year-on-year growth (averaged across regions and across customer tiers) of 19%, and we predicted a potential rise in the mid market of up to 25% in the fiscal year covered by this publication.

Readers are asked to turn to this year's market analysis for a more thorough examination of the forces shaping the global RFA PLM market in 2014/15, but suffice it to say that PLM remains an attractive proposition for businesses of all shapes and sizes, everywhere in the world. The statistics provided by the cross-section of brands, retailers and manufacturers who took this survey also underline the fact that PLM, properly chosen and implemented, continues to make an appreciable difference to sales performance, cycle times, trend awareness, international collaboration and a range of other metrics that matter in this competitive, rapidly-changing industry.

But this year's more streamlined customer feedback also reveals a clearer picture than our previous surveys of the need to treat a project of this scope with the diligence it deserves.

Widely considered by vendors and analysts alike as the equal of ERP or any other full-scale enterprise initiative, a modern PLM project - conducted to its full potential – will touch every aspect of the business, even prior to approaching the market and attempting to select a solution.

As PLM, on balance, has become more capable and more intuitive, with more to offer to a wider range of end users, its reach has also extended to essentially every stage of the product lifecycle, from inspiration to consumer.

Trend, design, sourcing, sampling, virtual prototypes, supplier management, quality control, collection planning, store planning, marketing, compliance – all of these and more will be touched by a PLM project, and all of their needs must be taken into account when analysing the current state of the business (process maturity and the need to re-engineer prior to PLM) and the desired outcomes of the right vendor and on-going implementation.

There can be no doubt that the sheer scope of modern PLM presents a terrific, unrivalled opportunity to deliver efficiency savings, consumer loyalty, better quality, better fit, better margins and all manner of other compelling benefits, but these are significant, long term returns that require a

significant investment of time and preparation to realise.

The most apt word to describe modern PLM is “potent”. Its potential is undeniable, and many – if not all – of the world's leading brands and retailers have used it to reach new heights of profitability and efficiency, and even to unlock entirely unforeseen kinds of creativity that simply would not have been possible with traditional tools.

In the right hands, PLM is capable of creating positive, enduring change to critical processes, but without due care, preparation and change management (on the part of both customer and supplier) a project can overrun by years – as evidenced in these results – or even fail entirely.

We encourage any brand, retailer or manufacturer reading these results to remember that adopting PLM is not a matter of buying the most competitively-priced variant of a one-size-fits-all product.

Examining your business and then using the results of that introspection to shortlist and select a vendor is about more than choosing software: it is a search for a long-term strategic business partner whose software, professional services teams and roadmap will all play pivotal roles in your future.

Readers are encouraged to read the following pages of analysis in full, and to visit our website (www.whichplm.com) to read our recent Supplier Evaluations, which are designed to assess vendors on precisely this kind of multi-year stability and vision.

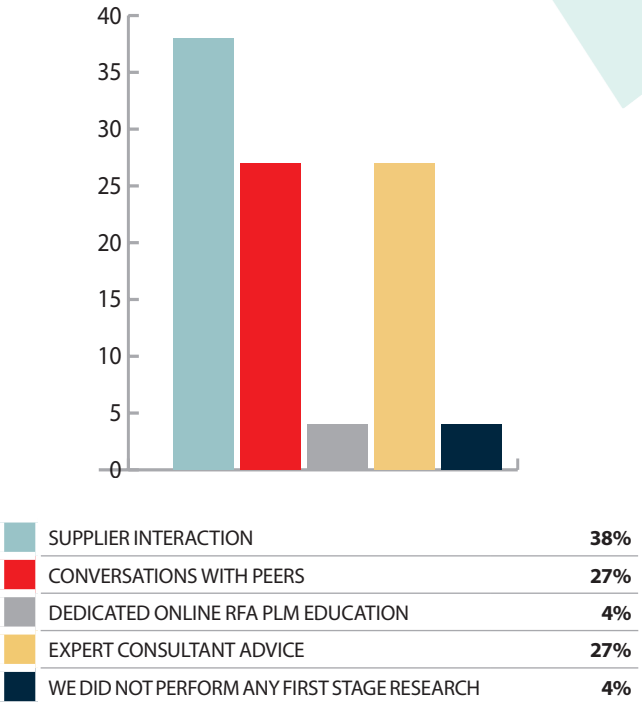
“In the right hands, PLM is capable of creating positive, enduring change to critical processes, but without due care a project can overrun or even fail entirely.”

SECTION 1 | PRE-SALES: PROJECT RESEARCH & PREPARATION

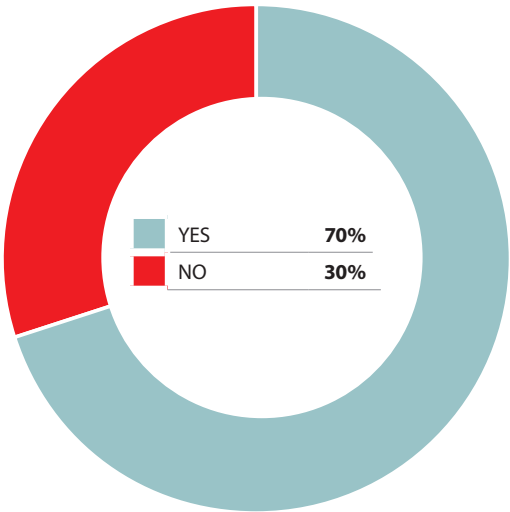
1A Did your project team perform any first-stage research before commencing your project - working to build an understanding of the scope of modern PLM and the nature of the different vendors? If so, how was this conducted?

Analysis: The rapid growth of the market has given rise to a feeling of urgency, and it is not uncommon for prospective customers to begin their project by looking at software vendors in detail, rather than considering the broader implications of the project, and indeed questioning whether PLM is even the right fit for their requirements. Fortunately, only a small percentage of this year's respondents neglected this stage; the remainder split their efforts relatively evenly between talking to suppliers, soliciting advice from experts, and speaking with industry peers. We expect to see further use of educational services - our own WhichPLM Academy amongst them - in future.

"We researched PLM for 3 years before commencing the PLM Selection Process. We went to apparel & retail based trade shows and spoke to many vendors."

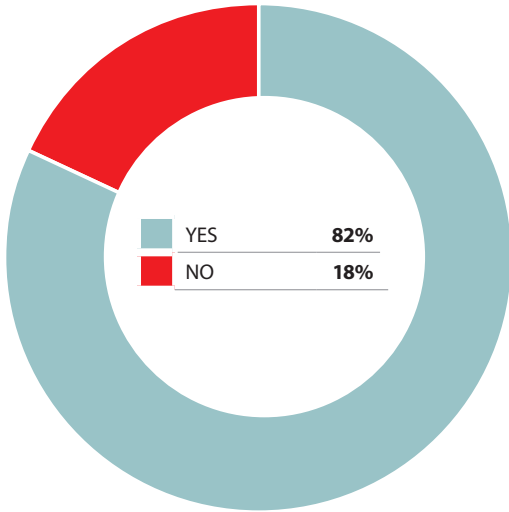


1B Do you feel your team was equipped with the necessary knowledge of the true nature and scope of a PLM project prior to beginning shortlisting and selection?



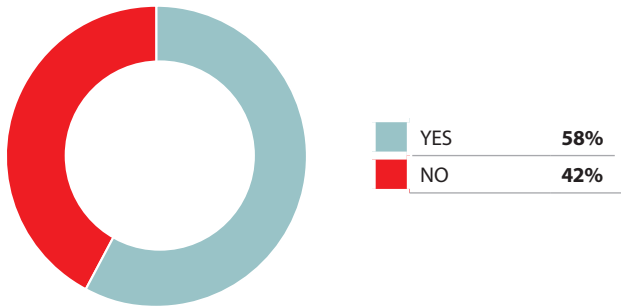
Analysis: While it is encouraging to see that 70% of this year's respondents assembled their PLM project team with care and consideration, we are nevertheless concerned to see that almost a third of all the implementations we studied were undertaken without a true understanding of the scope of modern PLM. Our survey results do not reveal the exact shape of this knowledge deficit, but hands-on experience suggests that many project teams are unfamiliar with the software itself, are unprepared for its impact on day-to-day operations, or are not properly equipped to make an informed choice of vendor. It is vital that project teams realise that a PLM project is equal in scope to an ERP implementation or any other large-scale enterprise transformation.

1C Did you conduct an in-depth analysis of your current business processes and associated challenges prior to implementing a PLM solution?



Analysis: Although these results are more positive than those we saw in question 2, we must underscore the importance of a customer understanding their business - from infrastructure to process - in finite detail prior to choosing and implementing PLM. Rather than being a simple process of software installation, a truly modern PLM project is better thought of as a business transformation initiative - one that requires radical process re-engineering and technological change in order to be successful.

1D Did you weigh the likely costs of the project against the costs of continuing in a disconnected environment, without PLM?

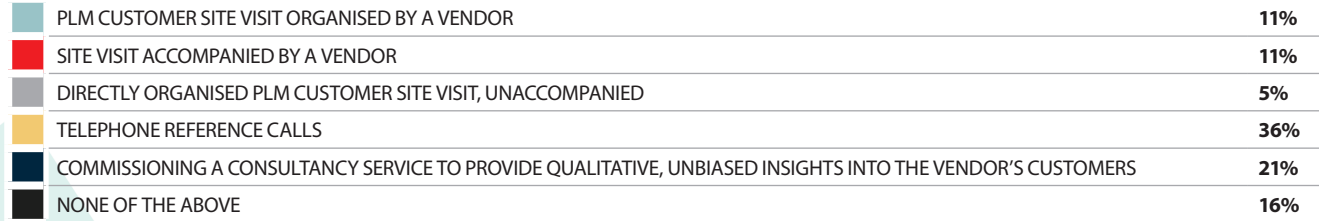


Analysis: One trend that emerged from this year's survey results was a willingness on the part of customers to begin their PLM journey without effective cost to benefit analysis. This may sound unfathomable to an outsider, but almost half of the retailers, brands and manufacturers we spoke to this year - including profitable, public companies - bought PLM without giving any real consideration to its value, or the cost implications of proceeding without it. This kind of initial budgetary planning is separate from detailed, scientific return on investment analysis and neglecting it can lead to rapid loss of control over the cost of the project as a whole.

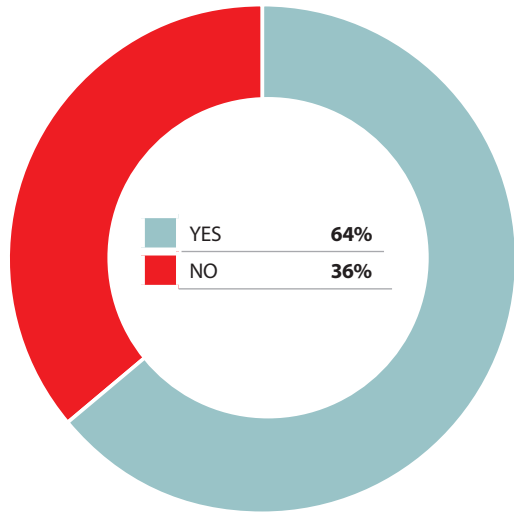
"Continuing to function in a disconnected environment was no longer an option due to the errors, workload and lack of visibility."

1F We believe that it is critical for prospective PLM customers to conduct reference site visits. Did you conduct any of the following before making a final PLM purchasing decision?

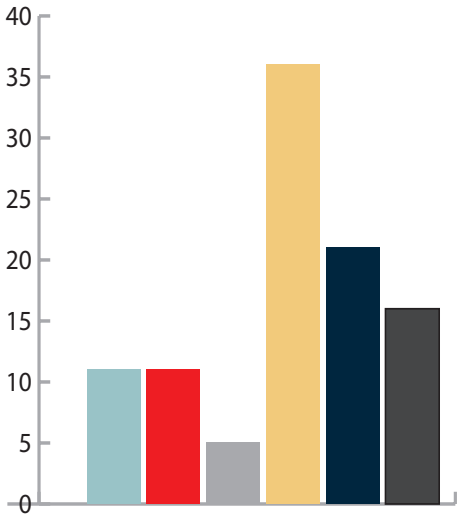
Analysis: Customer reference site visits (where a prospective customer is invited to attend the premises of an existing customer, or speak to them via telephone) present an opportunity for new customers to ascertain how the functionality and user experience they have seen in pre-sales demonstrations transfers to a comparable production environment to their own, and to gauge end user satisfaction and realised value. It is important, though, that customers attempt to arrange these without intervention from their shortlisted vendor(s). This year almost 60% of customer references originated with a vendor, while WhichPLM considers direct contact - or contact arranged and mediated by an impartial advisor - to yield far better results than accepting the references presented by vendors at face value.



1E Did your business tailor its Request For Information (RFI/RFP) questionnaire according to the unique challenges and processes your project team had identified?

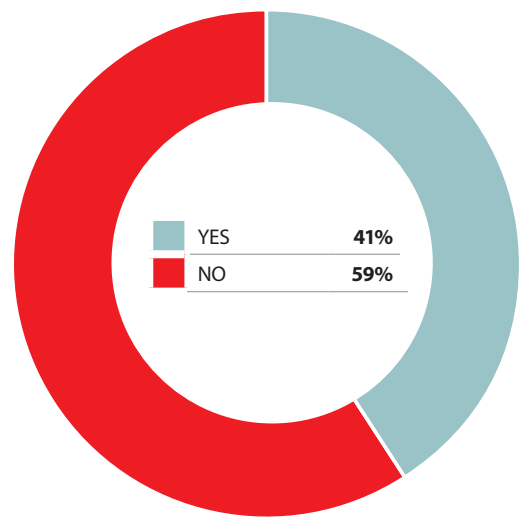


Analysis: As the introduction to this section explains, we sought to reduce ambiguity in this year's results by narrowing respondents' available answers to affirmatives or negatives where possible. When we consolidate uncertain and negative responses to the same question in our 2014 Annual Review, this year's results still represent a downward trend. Judged on this basis, we see a rise of 14% in customers whose PLM selection process amounted to buying what they saw as a "one size fits all" solution, rather than selecting the most suitable one for their specific needs.



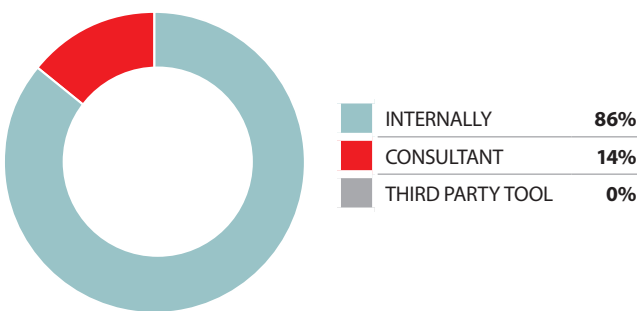
SECTION 2 | PRE-IMPLEMENTATION: ROI ANALYSIS & ADVISORS

2A Did you complete a thorough, scientific Return On Investment (ROI) analysis in advance of your implementation?



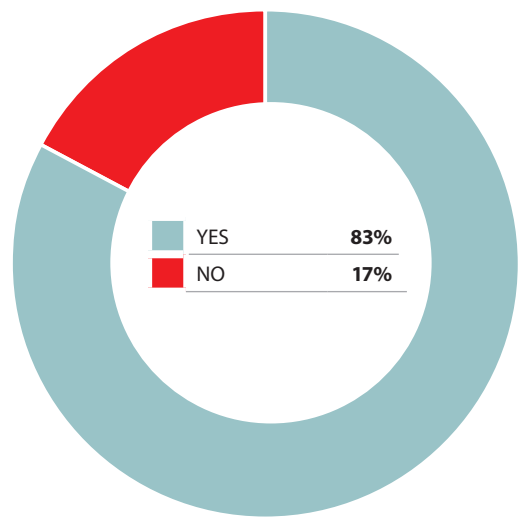
Analysis: Tied to initial budgeting, an ROI analysis is an essential tool for both understanding the cost to benefit ratio of a PLM project, and for directing the project itself to deliver the most potent benefits in the desired timeframe. Proceeding without this information - as an extremely worrying 59% did in the year 2014/15 - can severely limit not only the potential for later analysis of the project, but its ability to meet expectations in the first place. We consider this discouraging trend to be caused by inexperience on the part of customers and vendors alike in conducting real ROI analysis, and a lack of standardised methods of doing so.

2C If yes, did you conduct this analysis in-house, did you use a third-party ROI tool (such as an ROI calculator), and did you employ the services of a consultant or advisor?



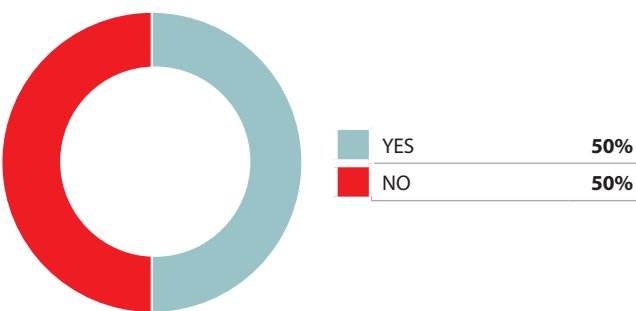
Analysis: Amongst those respondents who did conduct a detailed ROI analysis, none employed a third party tool (such as a software calculator), while the remainder overwhelmingly chose to have their internal team take the lead. While this approach is by no means impossible, WhichPLM's experience of PLM projects leads us to recommend that more customers consider using an impartial, expert advisor to undertake this analysis on their behalf. While internal teams certainly understand their own section of the business - often referred to as a "silo" - it can prove difficult for them take a whole-business view, and to consider the full scope of the extended PLM landscape. The right advisor in this instance will be a subject matter expert, armed with an extensive list of questions designed to drive a most detailed analysis of the value a business can obtain from PLM.

2B If yes, did you use that ROI analysis to define your implementation strategy?



Analysis: Although more of this year's respondents neglected to undertake an ROI analysis than in any previous year, we are pleased to see that amongst those who did, a vast majority then used this analysis to shape their implementation, prioritising immediate benefits (the proverbial "low hanging fruit") but providing an informed framework for the longer term. Needless to say, conducting this kind of detailed analysis only to proceed without heeding its advice is likely to create a directionless implementation, and one that may fall short of its potential.

2D Did you use any third-party consultants or advisers to help you plan your implementation beyond the ROI level?

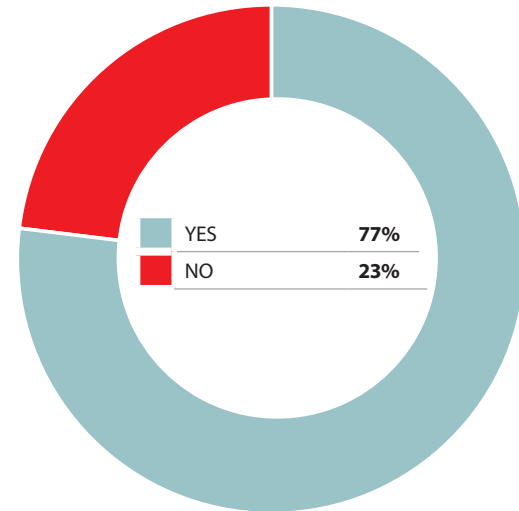


Analysis: It is interesting to see an even split in these results since it reinforces anecdotal evidence suggesting that greater numbers of PLM customers are employing third party advisors to help manage their PLM projects. The WhichPLM advisory team has worked with several brands and retailers in the period covered by this publication, and we believe (as this evidence supports) that experienced subject matter experts are increasingly being sought out by more educated customers around the world.

2E As part of your PLM project preparation, did you conduct a master data project in which you identified and cleansed all critical data elements required to support your implementation?

Analysis: The subject of master data is one that WhichPLM has covered in our publications before, and is something we routinely cite in our advisory engagements as one of the most vital preparatory stages of any PLM project.

Until recently, cleansing and consolidation of essential business data was typically treated as a small initiative that could be run either concurrently with an implementation or afterwards, so it is heartening to see that a large majority of this year's respondents recognise the importance of defining data formats, fields and international standards at an earlier stage.

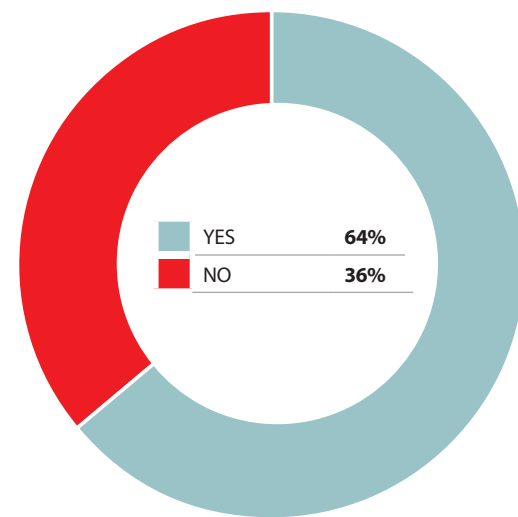


"All data that needed to be housed in the new PLM system was cleaned up prior to implementation. A systematic load of data was used to efficiently load cleaned data prior to first use so users could easily transition into the new system. Not all of our data is housed directly in PLM. We integrate to different systems for many data points as well."

"We cleansed the data after it was extracted from our legacy system (in Excel) and before it was imported into PLM."

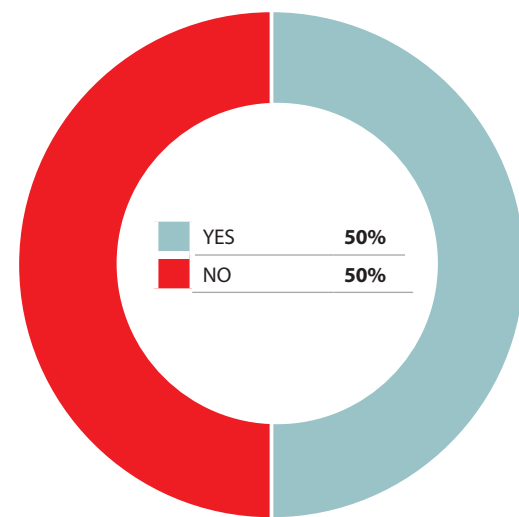
SECTION 3 | IMPLEMENTATION: WORKSHOPS, CUSTOMISATION & QUALITY

3A Did you conduct a process maturity workshop ahead of your PLM implementation?



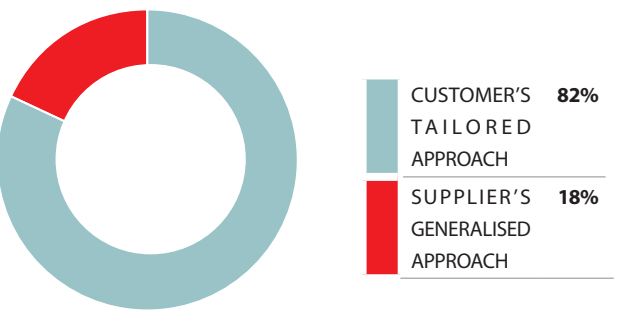
Analysis: A key tool for process re-engineering, internal process workshops are designed to help identify how processes will be prioritised and targeted as the new system is implemented, and to establish clear goals for their improvement. It is important that these workshops also take account of the unique challenges facing the business - ideally those identified during the initial budgeting, ROI and RFI stages - since this enables more accurate prioritisation at every stage of the extended supply chain, from concept to delivery. This year's results suggest that customers are placing an adequate amount of emphasis on these workshops, but the 36% that are not are essentially using PLM as a way of speeding up old processes, rather than enabling new ones.

3B Did you examine the results of that workshop in concert with your chosen PLM vendor, to assess their solution's suitability?



Analysis: Armed with knowledge of both the current state of their processes and their desired goals (the "as-is" and "to-be") a PLM customer should then use this information to assess their shortlisted vendors' ability to close the maturity gap and support their longer-term strategic objectives for process re-engineering. That only half of this year's respondents did so is certainly a cause for concern - particularly when software vendors are asked to tailor their demonstrations to the "day in the life" model.

3C 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 greater ROI potential in your particular case?



Analysis: With the growth of the RFA PLM industry has come attempts to codify implementations. Some vendors have, in recent years, attempted to establish what we call “boilerplate” implementation plans, encouraging all of their customers to conform to a set approach, rather than treating each new PLM project on its own merits. We are happy to report, then, that this year’s responses paint a different picture, with more than 80% of all implementations structured in the way that best suited the specific challenges and opportunities at hand.

“The PLM solution we chose is highly configurable. We did not require any customisations but we did require a good deal of configurations.”

“We initially intended to use the software out-of-the-box, but we ended up needing major customisation.”

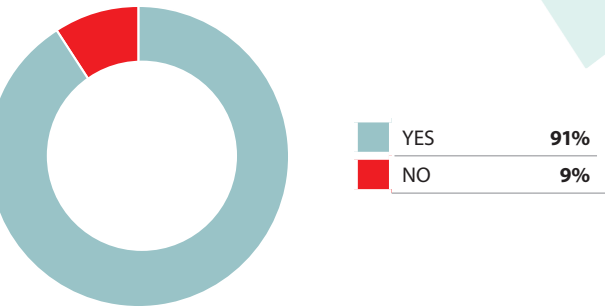
“Customisations to allow for unique supplier access to the system, which is driving the main benefit of a new PLM implementation”

3E Was any customisation conducted on time and to budget?

Analysis: As this year’s results attest, practically all PLM implementations require some element of bespoke work, making it crucial that prospective customers factor in the additional expense and delay caused by customisation. Although PLM itself can be implemented relatively quickly - although certainly not in the weeks that some vendors claim - the responses we received this year suggest that 60% of this necessary customisation work either exceeded its allocated budget or overran the allotted time.

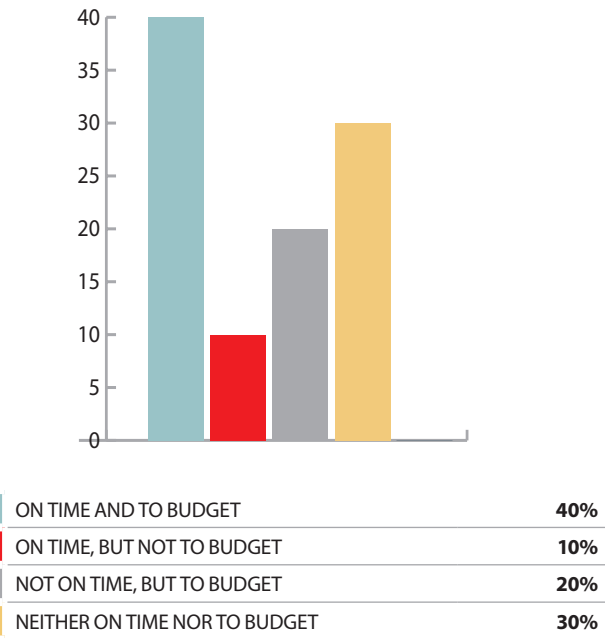
“[The configurations to our solution] allowed us to implement a solution that was tailored to our requirements but still allows us to maintain a seamless upgrade path.”

3D Whether you chose an out-of-the-box product or not, did you require any customisation to the solution you chose?



Analysis: WhichPLM has always remained sceptical of the term “out of the box”, which is a label applied to PLM products that vendors state can be implemented in a short time frame, and that can be considered fully operational with minimal or no customisation.

Our hands-on experience of PLM projects suggests that this “one size fits all” promise is unrealistic, and the responses to this year’s survey support that conclusion. Although their customisation was not all extensive, almost none of this year’s respondents was able to achieve the full potential of their chosen PLM solution without additional work.



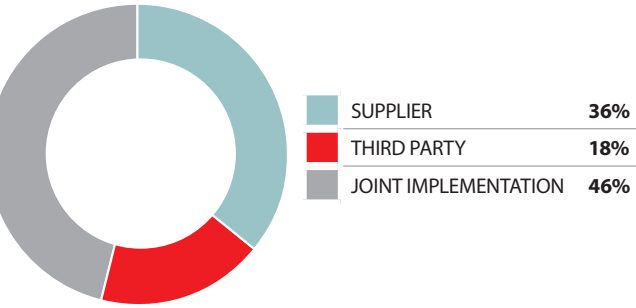
3F In your opinion, were the implementation team deployed to serve your project fully qualified and experienced in both fashion and the technical and functional aspects of PLM?

Analysis: The rapid growth of the RFA PLM market - as evidenced in our market analysis - is placing a great deal of strain on a very limited pool of highly skilled apparel PLM experts.

For this reason, inexperienced resources are sometimes assigned to projects out of necessity, and although we are happy to see that the majority of implementation professionals demonstrated industry-specific technical and process expertise, it is worrying to note that 13% of projects were run by people who lacked the knowledge and skills to assure their success.

A sobering analogy would be to compare this to employing a mechanic who had never worked on a car before - something most of us would never consider.

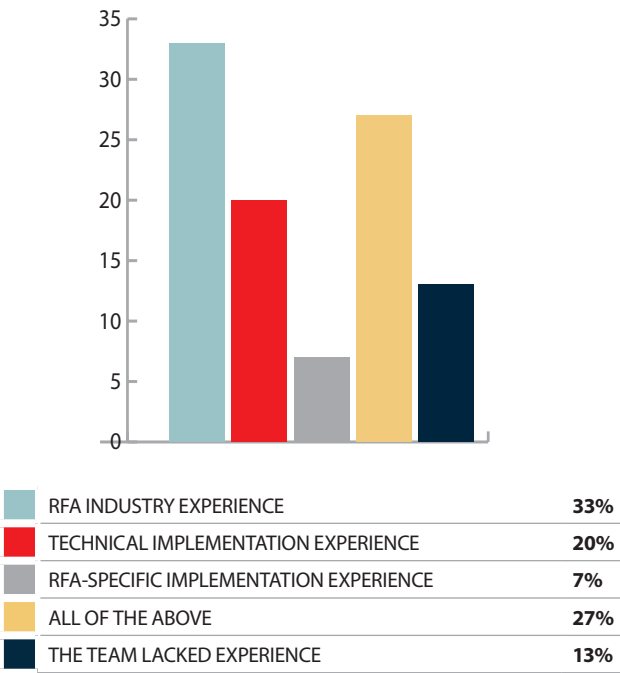
3G In your case, was the implementation handled in-house by a supplier team, or given to a third party implementer? If the latter is true, who was that third party, and was the entire implementation handled by them, or as a joint initiative?



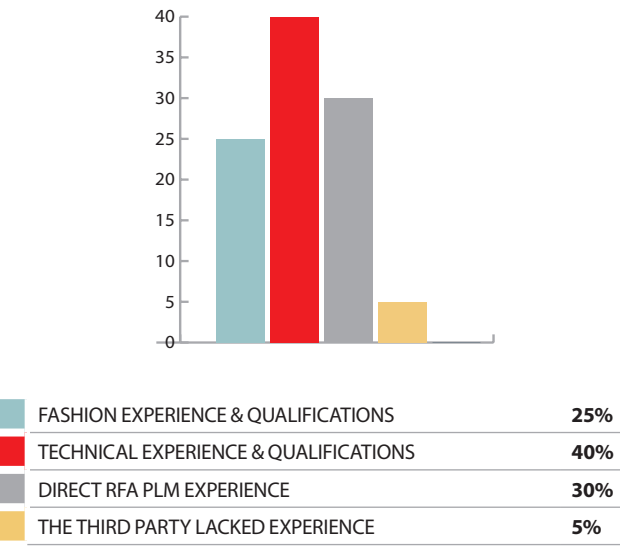
Analysis: Previous surveys have demonstrated a growing tendency for PLM vendors to contract their implementations out to third-party partners - in part because of a shortage of in-house resources. This year’s results reveal that more than 60% of implementations involved in a third party in some way, either in isolation or as part of a joint implementation. Rather than being the exception, this approach is rapidly becoming the norm, and we are encouraged to see several vendors employing high-level subject matter experts to help coach their own implementation teams and partners.

“It was designed as a joint initiative with us, but in reality we needed a full implementation team.”

“We had a solution vendor and an integrator in charge to implement the solution according to our specification.”

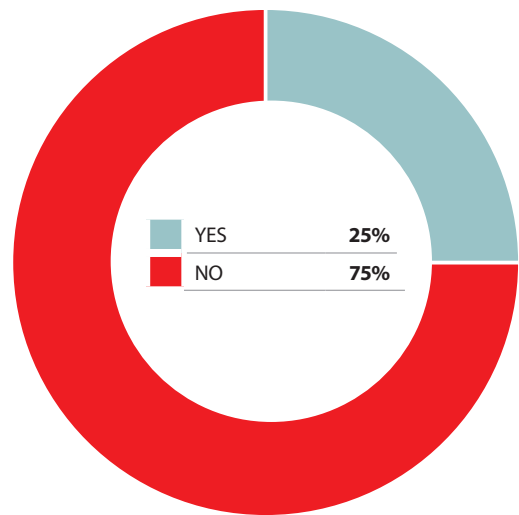


3H If your implementation was contracted out to a third party, do you believe they were suitably qualified for this task – well versed not only in the technology itself, but in the particulars of fashion-specific processes?



Analysis: For this question, we specifically asked customers whose implementation had been handed off from a core vendor team to a third party to comment on the experience. Although almost all of this year’s respondents were satisfied that the designated third party had either technical or fashion experience, under a third of them exhibited experience of conducting RFA-specific PLM implementations in the past. This may be accounted for by vendors’ decisions to work with large, multinational consultancies who offer their services across industries. In instances such as these, we encourage customers to be diligent about the qualifications and industry-specific experience of the professionals who will be conducting their implementation.

3I Do you believe that a PLM vendor's implementation team (and their third party partners, where applicable) should hold professional certifications governed by an independent body?



Analysis: The responses we received to this question - newly added for the Fifth Edition - suggest that customers see relatively little value in professional accreditation for apparel PLM professionals. This is something we expect to change in the near future, however, as customers become more aware of the number of implementations being conducted by cross-industry consultancy services, or by other third parties whose RFA PLM credentials may not be as strong as advertised.

As is the case with other industries, professional accreditation in PLM would serve to protect the interests of a growing and increasingly diverse customer base.

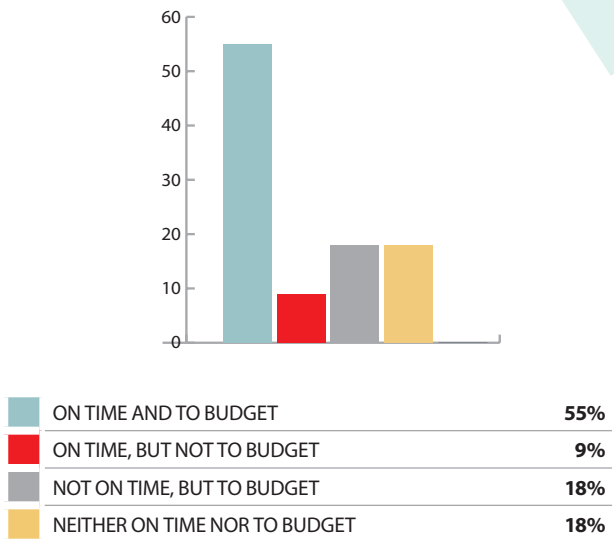
3K How was your PLM solution deployed? On-premise (using your own servers) or via one of several possible off-site models?

Analysis: In our 2012 Annual Review (just three years ago) 100% of implementations were conducted on-site, using servers owned and administered by the customer. At that time we grouped the range of different off-site hosting models under the term SaaS (software as a service), and the two years that followed showed some movements towards these.

This year's results - more granular now that SaaS, managed services, and cloud deployments were offered as separate options - reveal an increase of 11% on our 2014 results, suggesting that customers are becoming more comfortable with their business-critical data residing outside their walls.

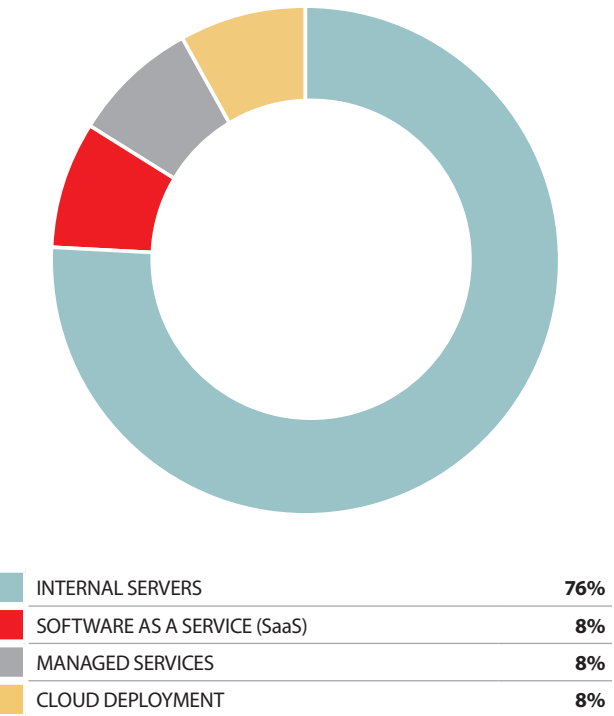
This steady increase in adoption is likely being driven by the migration of Microsoft Office, Adobe's Creative Suite and other tools to a subscription model.

3J Did your supplier and/or their third party implementation partner complete your overall implementation project on time and to budget?



Analysis: The percentage of implementations delivered on time and to budget has decreased every year that WhichPLM has surveyed the market, with this year's results representing only a marginal uptick in what has otherwise been a continuous downward trend. Today, 45% of all implementations either lag behind schedule, cost too much, or are both overdue and unexpectedly expensive.

It goes without saying that this should be a concern for the industry as a whole, but we remind readers that much of this overrun and overspend could have been avoided through better planning, more diligent selection processes, scientific return on investment and process maturity analysis, and the other preparatory steps listed earlier in these results.

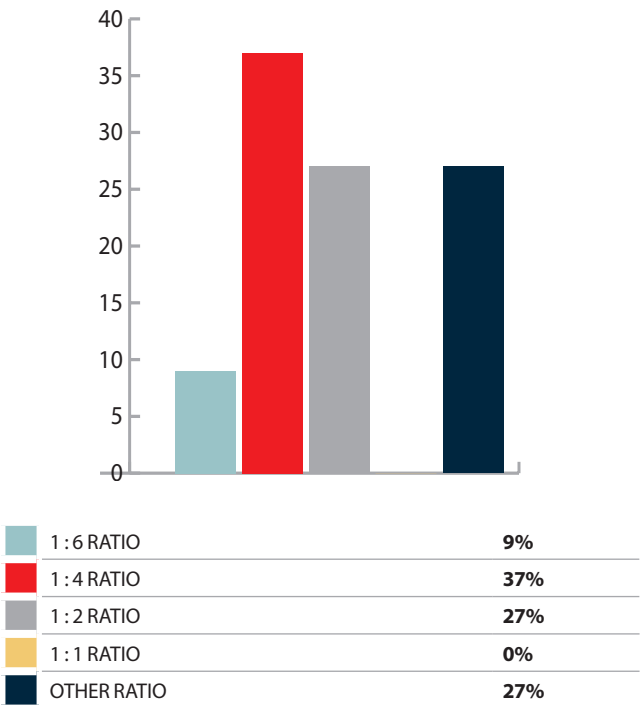


SECTION 4 | AFTER IMPLEMENTATION: SATISFACTION

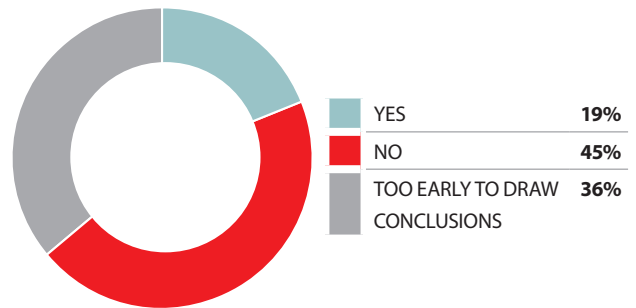
4A What was the ratio of software licensing to service costs for your project?

Analysis: When PLM first entered the RFA industry, the majority of a typical project cost came from what we refer to as services (including training, implementation, customisation and configuration) rather than from the expense of purchasing the software licenses themselves. This is referred to as the software : services ratio - something that around the turn of the millennium would have been expected at around 1 : 10. Since that time, the ratio has begun to approach a kind of parity, and today typical project costs are far more evenly balanced between licensing and services. The market analysis in our 2014 Annual Review suggested that ratios of 1 : 4 and below would become common in the next twelve months - a conclusion supported by this year's results. (The "other ratio" category includes numerous responses that fall within the expected results, but are not whole numbers.)

"We haven't fully implemented PLM yet, however our budget provides for a 1 : 2.5 software : services ratio."

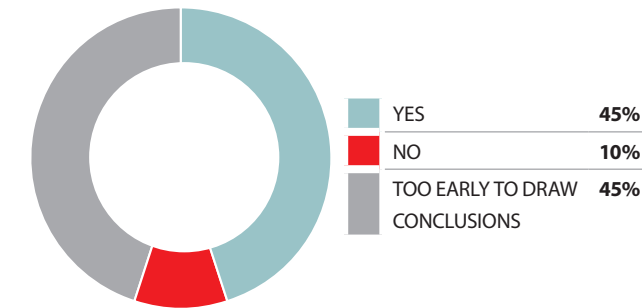


4B Following your initial introspection, ROI analysis and implementation, have you been able to quantify on a process-by-process basis the value that PLM has delivered to your business?



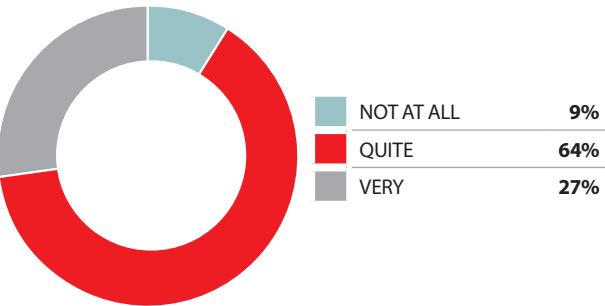
Analysis: Although these raw results may not seem too damning, the picture becomes bleaker when we consider that around 20% of respondents who indicated that it was too early to draw conclusions never undertook an ROI analysis to begin with and will not be able to scientifically quantify a return upon project completion. This leaves 67% of customers (a significant increase on even the highest figures from our 2012, 2013 and 2014 Annual Reviews) unable to say with any certainty whether their solution has delivered value. In an extremely competitive market where every square centimetre of fabric counts, this represents hundreds of thousands of dollars going unscrutinised and is a situation customers should seek to avoid at all costs.

4C 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?



Analysis: Unlike a more scientific ROI analysis, increases to sales and revenue following a successful PLM implementation are relatively simple to measure. Almost half of this year's respondents were at too early a stage in their implementation for this metric to be effective, but amongst the remainder an overwhelming majority saw their PLM solution have a direct positive impact on sales.

4D 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?



Analysis: For every year that we have tracked it as an indicator of satisfaction, the market as a whole has responded well to the experience of working with PLM. Generally speaking this remains the case today, with a considerable majority being quite or very satisfied with their chosen solution's interface and overall user experience (UX). The fact that the majority of respondents rated their experience somewhere in the middle suggests - as we have in previous publications and in our freely downloadable Supplier Evaluations - that user experience will soon become a major differentiator for enterprise solutions, meeting expectations set by consumer grade software.

4F Through our close relationships with PLM vendors, we know that end user feedback factors heavily into their development roadmaps. With that in mind, which of the following areas would you like to see vendors focus their efforts on?

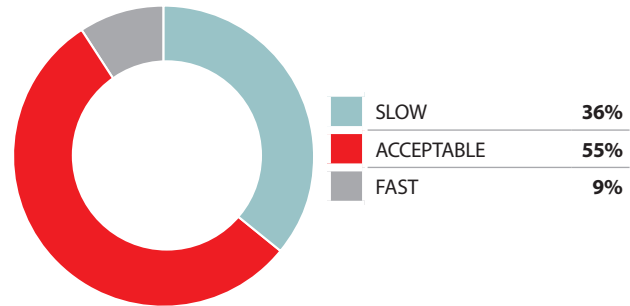
Analysis: Considering the evolution that PLM has undergone since WhichPLM first began soliciting customer feedback, our analysis team expected responses to this question to reveal an appetite for new and bleeding-edge functionality. Instead, these results reveal that improvements to the fundamentals of PLM - sourcing and RFQ, technical and material development - remain high on customers' lists of desired improvements. This should perhaps not have come as such a surprise, given that our own Supplier Evaluations are yet to award a coveted five-star rating to any core PLM functionality. It is encouraging to see CSR and colour development earning greater recognition, though.

"Materials Lab Testing: the trend seems to be toward 3rd party testing labs, however, we have an in-house team that manages our materials testing. None of the solutions we reviewed had much of an advanced offering in this area."

"Enhanced Collaboration: ability to share boards, CADs, etc."

NB: In the table adjacent to this analysis, 1 represents the most-cited area(s) for continued development, and 5 the least.

4E 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.

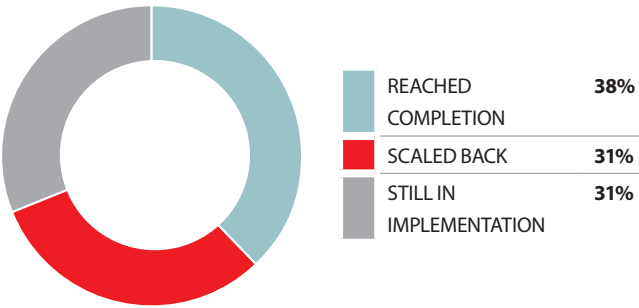


Analysis: Distinct from user interface (and only a small component of UX), the speed of PLM modules can be extremely variable, governed by infrastructure, optimisation and - in the case of off-site hosting models - connection speed. While the majority of this year's respondents classed their solution as being acceptable, almost 30% more of them rated it as "slow" when compared to their counterparts in 2014. Tied to the steadily expanding scope of PLM and extended PLM, click rates and refresh speeds have become a priority for vendor research and development teams, although customers must remember that even the most optimised modern solutions demand greater resources than older PLM or PDM products.

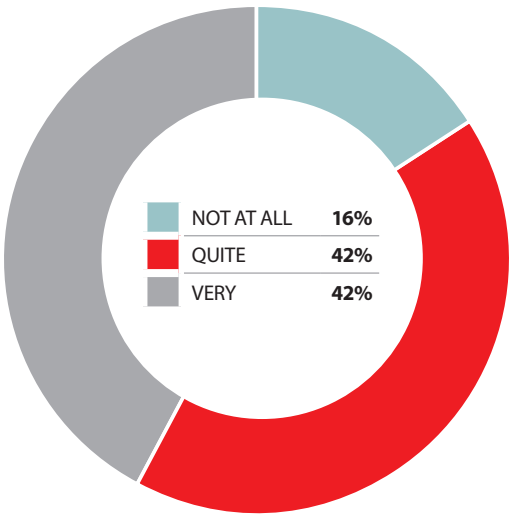
1	MANAGEMENT FUNCTIONALITY (CALENDAR MANAGEMENT & WORKFLOW, BUSINESS INTELLIGENCE, DASHBOARDS, REPORTING); SOURCING & RFQ (COSTING, BILL OF LABOUR, QUOTATION MANAGEMENT, SUPPLY CHAIN TRACKING & CONTROL)
2	TECHNICAL DEVELOPMENT (TECHNICAL SPECIFICATION, MEASUREMENTS, 2D PATTERN & DESIGN, 3D VIRTUAL DESIGN & SAMPLING); MATERIALS DEVELOPMENT (MATERIAL, COMPONENT, TRIM, PACKAGING & LABELLING)
3	COLOUR DEVELOPMENT (TRENDS, SEASONALITY, TESTING, PALETTE DEVELOPMENT); CORPORATE SOCIAL RESPONSIBILITY (QUALITY ASSURANCE, AUDIT MANAGEMENT, LEGAL REQUIREMENTS, SUSTAINABILITY & COMPLIANCE)
4	MERCHANDISE PLANNING (FINANCIAL, ASSORTMENT, MATERIALS, STORE & MARKETS); CREATIVE DESIGN (TREND ANALYSIS, STORYBOARD, 2D DESIGN, 3D AVATAR & ENGINEERING DESIGN, 3D PRINTING, CAD, KNITS, WEAVES ETC.)
5	CONSUMER EXPERIENCE (VOICE OF THE CUSTOMER); MARKETING & CUSTOMER ENGAGEMENT (PHOTOGRAPHY & EDITING, SOCIAL MEDIA, COMPETITIVE ANALYSIS)

4G In the case of your implementation, was the initial vision for your project realised, or was that goal tempered in some way?

Analysis: Of those respondents whose implementations were considered complete - two thirds of the retailers, brands and manufacturers we surveyed for this publication - slightly less than half had been scaled back in some way from their initial vision. This compromise may have been the result of an impractical or over-ambitious initial vision, or because of inadequate preparation, selection and process analysis processes. The incidence of implementations that exceeded their allotted time and budget may also have influenced this result.



4H Overall, how satisfied are you with the PLM solution and vendor you chose?

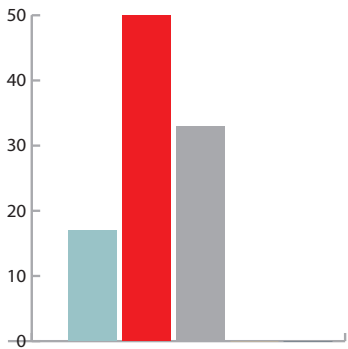


Analysis: As the most succinct indicator of the current market, we are pleased to see that 84% of customers were quite or very satisfied with their chosen solution and vendor partner. Particular attention was paid in the comments we received to the international reach of certain vendors, and to the expertise of certain third party advisors. Amongst the small segment of respondents who were dissatisfied with their implementation, responsibility may be assigned equally to the vendors and customers in question - none of whom appear to have had the requisite experience or undertaken the right degree of introspection and preparation prior to embarking on an implementation.

"Our custom built PLM solution and inexperienced vendor are costing us extra money/time in the long run. Little to no planning was done to map the project life cycle. Eventually, we will be implementing 5 year old technology and antiquated methods."

"I have always found the support [our vendor] has given us to be above and beyond what would normally be supplied by a vendor. Without it, we would not have achieved the results we have.."

4I Are you considering replacing or upgrading your present solution – even if it is with a new version from the same vendor?



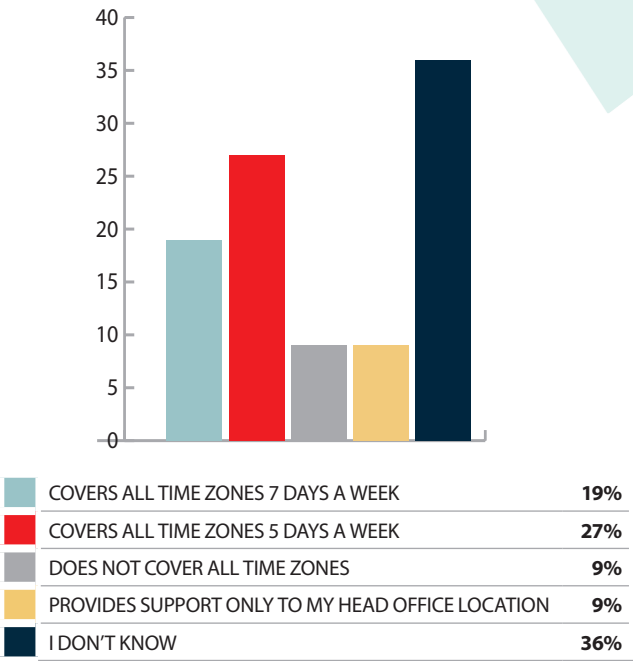
I AM HAPPY WITH THE SOLUTION I HAVE	17%
I AM CONSIDERING UPGRADING	50%
I AM CONSIDERING REPLACING MY CURRENT SOLUTION	33%

Analysis: A total of 67% of respondents indicated that they were satisfied with the vendor they chose - either with its current GA PLM product, or as the logical choice for an upgrade to a newer version. Of the remainder (33%) who expressed a desire to replace their solution (and possibly the incumbent vendor) it is likely that these originated with the combined 58% of respondents to the previous question who were either quite or not at all satisfied with their current solution. The RFA market for PLM is competitive and fast-moving, and the solutions these respondents have in place may be considered legacy more quickly than they had expected.

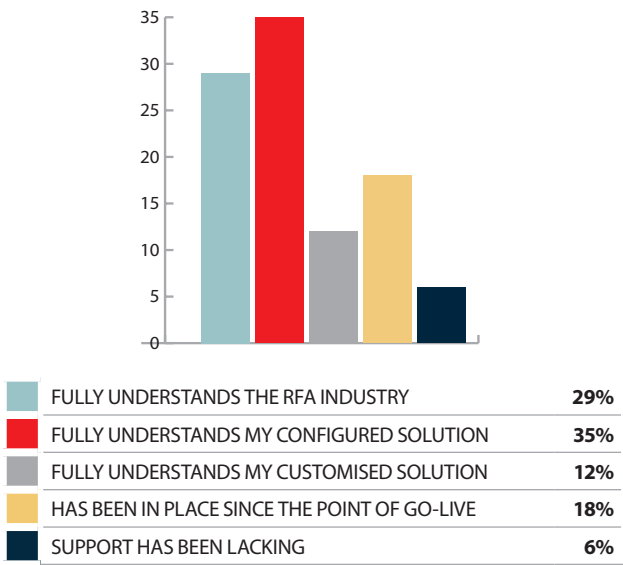
SECTION 5 | CUSTOMER RELATIONS & ONGOING SUPPORT

5A Does your supplier offer a support service that covers all time zones within your supply chain, on a 24/7 basis?

Analysis: Before analysing these results in detail, it is important to note that the majority of this year's respondents - some 36% - indicated that they did not know the availability of their chosen supplier's support services. We construe this as a positive response, since it suggests that these customers have not yet had cause to contact their designated support representatives. For those retailers, brands and manufacturers who have dealt with the supplier's support department, a reasonable percentage (around 18%) have found it unavailable outside certain timezones - something that will complicate a single-platform future, with supply chain partners sharing role-based access to the same platform and support services as headquarters.

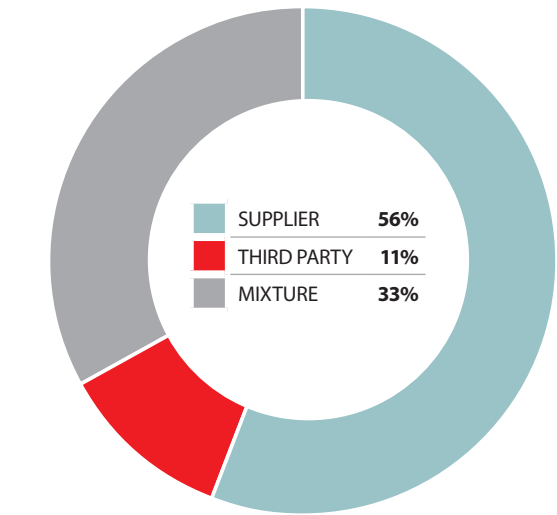


5B How would you class your supplier's support service? Does your supplier offer a support service that fully understands your configured or customised implementation, and has done so from the point of go-live?



Analysis: Our analysis team found the responses we received to this question to be a strong indicator that global support for PLM implementations - almost all of which are customised and / or configured in some way - is of a good standard. Of the retailers, brands and manufacturers we surveyed this year, the vast majority reported that their supplier's support service was familiar with the specific challenges of the RFA industry, and understood the configuration and customisation that had been applied to their particular implementation.

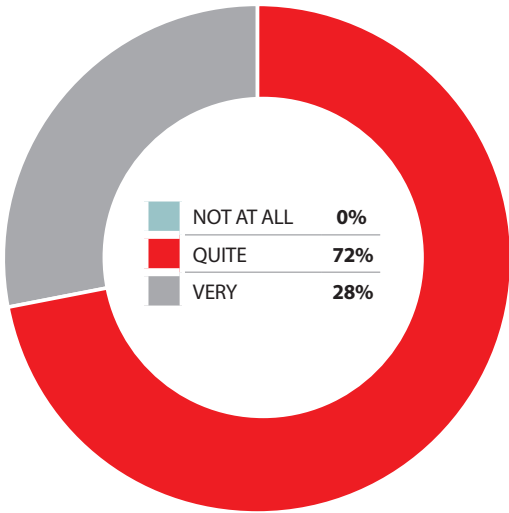
5C If your implementation was handled via a third party, who now manages your ongoing support?



Analysis: Due to the aforementioned constraints placed on third party resources - not to mention the temporary nature of their engagement with PLM implementations - almost all ongoing support is provided by the supplier's support team in some way. For the 33% of cases this year where a third party is working alongside the supplier's support service, thought should be given at the earliest possible stage to how and when a transfer of responsibility will take place, with a clearly documented handover procedure put in place.

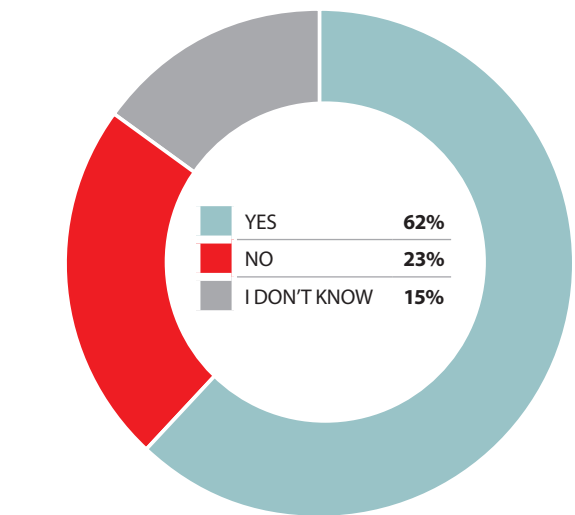
5D How satisfied were you with the technical support provided by your PLM supplier and/or third party implementer over the last twelve months?

Analysis: These results echo those we saw in previous questions: support provided by suppliers is generally considered to be good, with timely response provided by people who understand the product in a general sense and as it has been customised in particular use cases. We should note, though, that this year's survey responses came primarily from retailers and brands, at executive and head office levels. Once these implementations have been extended, with supply chain partners sharing role-based access to the solution, this level of satisfaction may alter depending on whether support staff's knowledge extends to the manufacturing level.



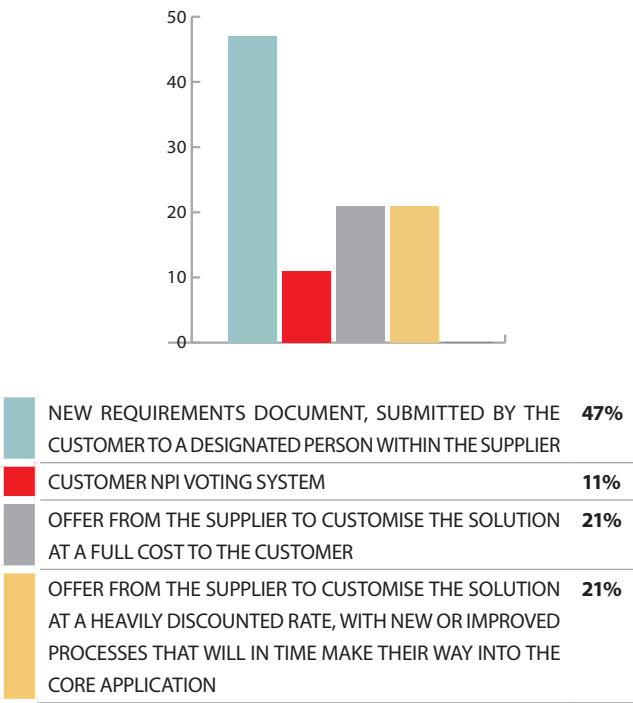
SECTION 6 | ONGOING PARTNERSHIP

6A Does your PLM supplier have a clear, documented process and policy in place to enable you and other fellow customers to suggest NPI and enhancements to the solution?



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 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. Although the majority of respondents felt that this process was clearly documented, first-hand experience suggests that it is often a less transparent and egalitarian process than customers may realise, with requests from more lucrative customers taking priority.

6B What mechanism(s) does your supplier have in place for taking on board your recommendations?



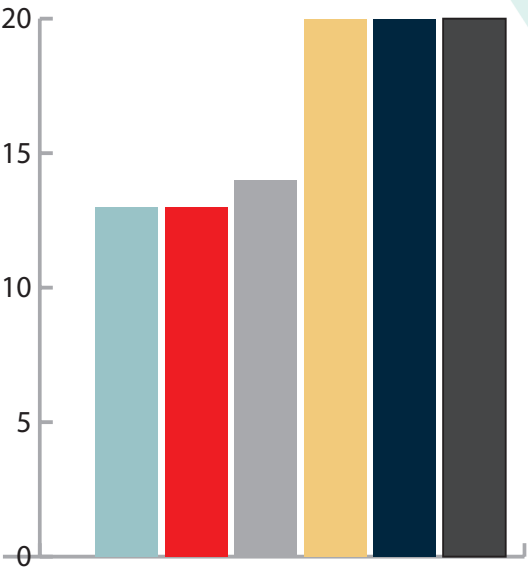
Analysis: To manage these requests and recommendations, the majority of suppliers appear to operate a "new requirements document" process, whereby a designated supplier contact submits a formal request that may or may not then be factored into development. It is interesting to see that of those vendors who took a less democratic approach, the cost of development was charged in full equally as often as it was discounted to take account of loyalty. Although WhichPLM does not disagree with bespoke development conducted at a particular customer's behest, it remains important that more generalised feature improvements reflect the wishes of the customer base as a whole.

SECTION 7 | THE FUTURE

7A Does your current PLM solution offer any Corporate Social Responsibility capabilities?

Analysis: Corporate Social Responsibility (CSR) is relatively new to PLM, with vendors working to design new modules as well as factoring regional and international compliance and guidance into their existing sourcing and supplier management solutions. As a result, only a third of the respondents who answered previous questions took part in this section; our percentage results for this question and the two that follow are therefore calculated on the basis of this smaller sample size.

GREEN DESIGN	13%
QUALITY ASSURANCE & CONTROL	13%
SUSTAINABLE MANUFACTURING	14%
TECHNICAL COMPLIANCE	20%
ETHICAL COMPLIANCE	20%
ENVIRONMENTAL COMPLIANCE	20%



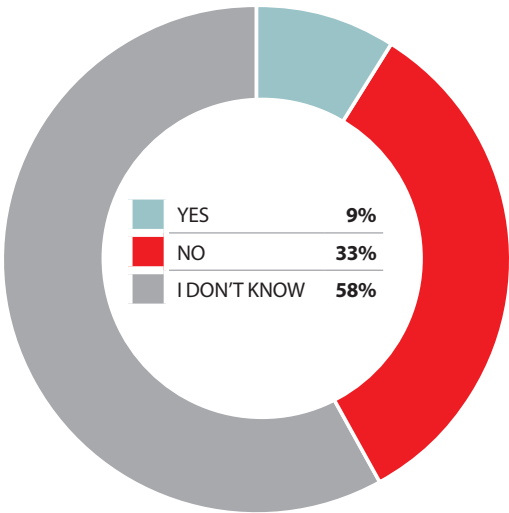
"Implementation is in progress."

"We hope to use most of [these functionalities], rolled out gradually."

"I'm not sure of the functionalities, as we use a different system [to manage Corporate Social Responsibility.]"

7B Does your current PLM solution offer a formal API link to the Sustainable Apparel Coalition's Higg Index?

Analysis: Those respondents who did answer our questions regarding CSR generally exhibited a good knowledge of the regulatory landscape and could articulate how compliance functionality in PLM might improve the sustainability and ethical standards of their international operations. Although 33% of those surveyed recognised that their solution lacked a formal API (application protocol interface) link to the Higg Index, those who were uncertain may indeed not be aware of the Index at all, since their operations resides outside the United States. To WhichPLM's knowledge, only one vendor has begun this kind of formalised API work to date, although we expect others to follow suit.

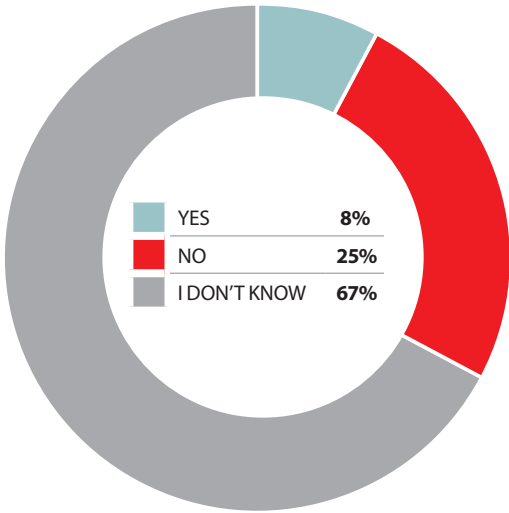


"We have yet to implement the Social Compliance modules, however in the design workshops to date, there is every indication that our requirements will be achieved through configuration. We have a commitment from [our vendor] that they will keep abreast of the developments of the Sustainable Apparel Coalition who are responsible for the Higg Index. I am confident that [our vendor] will be one of the PLM front runners for developing an API for the Higg Index"

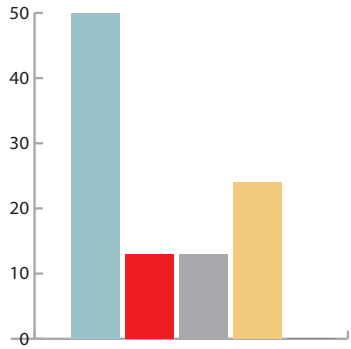
7C Does your current solution offer a formal API link to (or recognised partnership with) any other regulatory compliance programmes?

Analysis: As is the case with the Sustainable Apparel Coalition's Higg Index (arguably the best known of the current crop of guidelines) work remains at a preliminary stage for integrating other mandatory and voluntary standards into PLM.

Owing to the volatile nature of international trade agreements and the sudden shifts in forbidden and regulated materials and practices, many regulatory compliance programmes are themselves in their infancy, and it will take time for software modules incorporating them to become generally available.



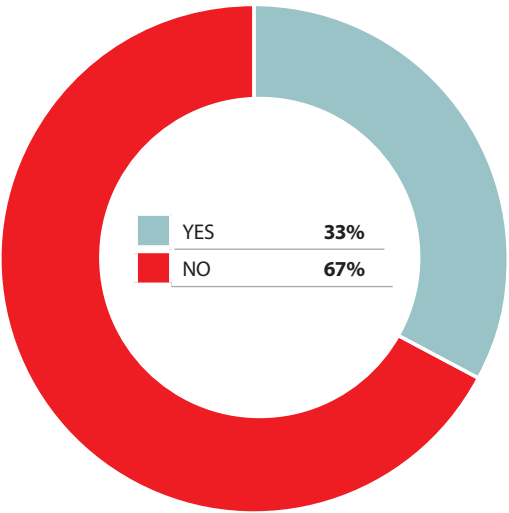
7D Is there a marketing module within your supplier's current PLM solution offering, including any of the following:



DIGITAL ASSET MANAGEMENT (MULTIPLE FILE FORMATS MADE AVAILABLE FOR DIFFERENT CHANNELS: PRINT, E-COMMERCE, REPORTS, SOLUTIONS ETC.)	50%
DEFINED MARKETING DATA CAPTURE (FORMAL PROCESS FOR CAPTURING MARKETING E.G. SHORT & LONG DESCRIPTION)	13%
AUTOMATIC OUTPUT OF IMAGES & TEXT TO CREATE ONLINE CATALOGUES & COLLECTION BOOKS	13%
ABILITY TO WORK WITHIN INDESIGN AND/OR PHOTOSHOP (INDESIGN FOR MARKETING PUBLICATIONS; PHOTOSHOP FOR IMAGE EDITING & THE CREATION OF NEW MARKETING MATERIALS)	24%

Analysis: As is the case with most questions in this speculative section of the survey, only around a third of respondents - distinct from the third who answered questions about CSR and 3D - were able to tell us about the marketing functionality offered by their chosen solution. While the concept of making centralised, contemporaneous data accessible across the enterprise is not new, PLM vendors (and indeed their customers) have only recently begun to embrace the idea of marketing-specific modules, most prominently seen in the extension of Adobe Creative Suite to PLM integration encompassing InDesign and PhotoShop in addition to the industry-standard Illustrator.

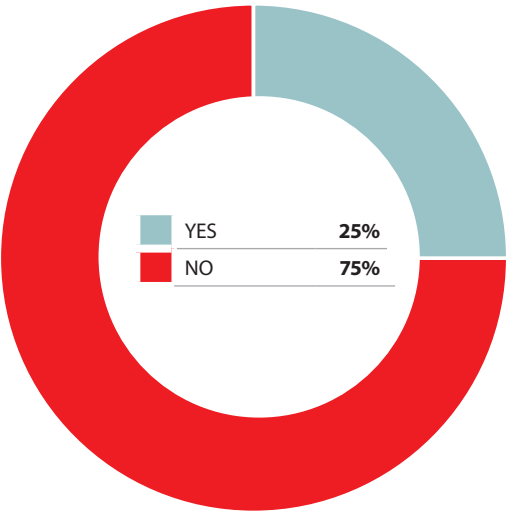
7E Does your current PLM platform have a 3D module integrated in their solution (possibly sold as part of a bundle or collection) or available separately?



Analysis: While adoption of 3D technologies within RFA is building, it is unrealistic to expect every PLM vendor to offer 3D functionality - whether this is through a partnership with a dedicated 3D supplier, or via their own development. Of the PLM suppliers who appear in this year's vendor listings, we know of only a fraction that can claim effective integration of 3D, and in most cases this is because the two solutions are part of a single portfolio. With physical sampling costs spiralling, however, we fully expect that virtual prototyping and 3D design tools will enjoy greater popularity in the very near future.

"I believe this is on their roadmap for 2016."

7F If not, does your current PLM platform integrate to one or more of the best-in-class 3D solution(s)?



Analysis: Developing a 3D solution - whether it's store visualisation or fabric simulation - is no small undertaking. Of those PLM vendors who do currently offer three-dimensional design and prototyping solutions, the majority have considerable, direct experience of manufacturing. Vendors for whom RFA is one industry sector amongst many are more likely to offer 3D technologies through a partnership arrangement, although the majority of this year's respondents indicated that their chosen supplier had not yet established this kind of arrangement.

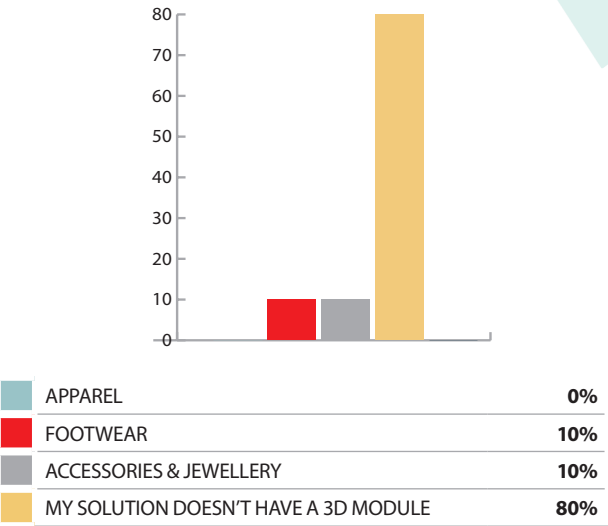
"I believe so, but have not thoroughly explored."

7H Does this 3D module enable you to use the following shared libraries

Analysis: Although only a small number of our respondents were able to answer this question - revealing that material composition was the only library shared between core PLM and their 3D module - the WhichPLM team knows from hands-on experience that some joint PLM and 3D vendors offer integration between their own 2D pattern CAD systems and 3D.

2D PATTERNS	0%
MATERIAL TRIMS & COMPONENTS	0%
MATERIAL TYPES & COMPOSITIONS (PLAIN, PRINT, STRIPES, & PHYSICAL MATERIAL COMPOSITION)	100%
COLOURS	0%

7G Does your current PLM platform feature a fully-integrated bi-directional 3D module for the following product types:



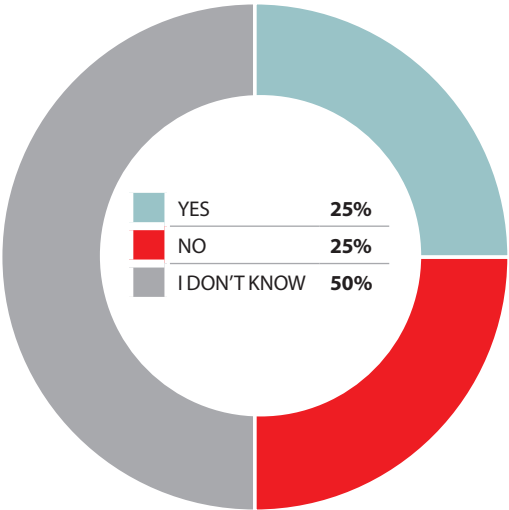
Analysis: Although we have discounted similar responses from other questions in this section, our analysis team chose to leave the results of this one unaltered, since they reveal the fertile potential market for 3D modules that either form part of PLM or are tightly coupled with core PLM functionality. Amongst those respondents whose PLM solution did offer PLM functionality, footwear and accessories emerged as the only product types catered for. We consider this to be representative of the industry as a whole, since believable fabric simulation - despite being pioneered by dedicated technologists - is only now reaching maturity and becoming suitable for the mass market.

"Part of their roadmap includes integrating with another software."

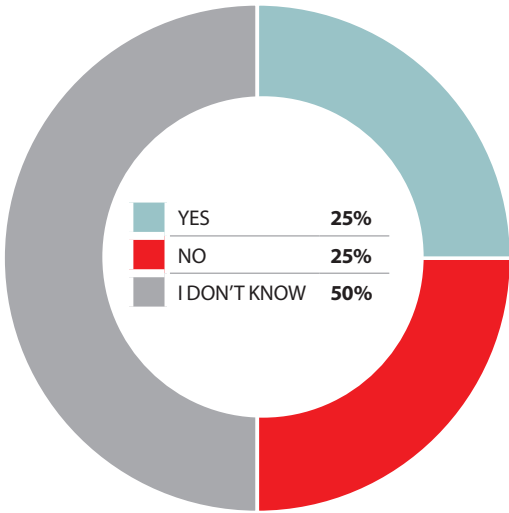
7I Does this 3D module offer in-store 2D (or 3D) planograms?

Analysis: Store planning is a common activity for retailers and brands - but one that is typically handled with a tool dedicated for the purpose. Today, however, 2D and 3D planogram functionality is being added to the 3D and store planning modules of some PLM solutions. These allow merchandisers to place products - and their associated metadata - from either a two or three-dimensional perspective, tailoring store layouts according to historical sales performance, collection integrity and other criteria.

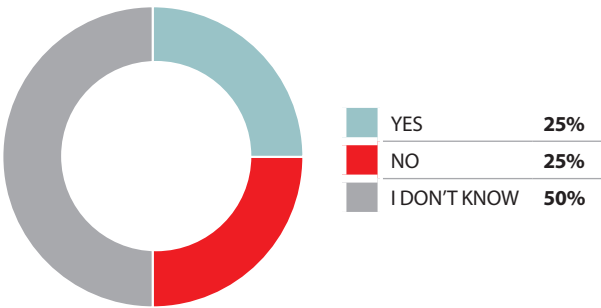
7J Does this 3D module offer a full 3D in-store visualisation (i.e. using virtual reality)?



Analysis: Traditionally, store planning is handled via planograms, but a growing number of specialist developers are offering 3D store planning tools that place the user in a virtual environment, and allow them to position garments, footwear and accessories with a greater degree of interactivity and artistry than typical planning tools allow. Some also factor in a heightened degree of business intelligence and consumer engagement, allowing for the relative sales performance of different store positions to appear in the virtual environment, or permitting marketing and retail teams to test product assortments, store layouts, and visual identities with sample shoppers. The latter kind of behaviour tracking can enable an additional layer of trend analysis when it is used to road-test store layouts and assortments prior to the physical products actually being manufactured.



7K Does this 3D module enable sample prototypes to be outputted to a 3D printer and/or digital fabric printer?



Analysis: The most experimental of the functionalities we asked this year's respondents to tell us about, 3D printing is the bleeding edge of technological development for retail, footwear and apparel. Very few of the retailers and brands we surveyed this year were able to answer this question, but it is encouraging to see the burgeoning adoption of 3D printing technologies we have discussed elsewhere in this publication evidenced in real-world applications. We know from interviews with vendors and brands alike that three-dimensional prototyping, design and sampling are delivering results, but it is exciting to see buttons, buckles, pullers and other accessories being 3D printed in addition to digital fabric samples - all of which can help to speed up the prototyping and sampling processes.

"Since we have only had initial discussions on what will be included in the 2016 roadmap, I am not fully familiar with the functionality that will be available."

Nearly
90%
will not return to a
brand if they have a
bad fit experience

Over
60%
of garments
are being sold
at a discount

Over
30%
of all fashion
bought is returned

What Are Your Business Challenges?

THE GLOBAL APPAREL BUSINESS EXPERT.

Providing practical, proven, real-world
advice, solutions and tools that enable
brands & retailers to align, engage,
and grow.

Data Gathering and Analytics
Design and Merchandising
Retail and Marketing
Product Development
Professional Development
Supply Chain Tools



GSD specialises in solutions for Time - Cost
Benchmarking, Productivity Improvement and
Social Compliance in Work Measurement, and
achieves this through the provision and
application of core software products:
GSD Enterprise and GSD QUEST.

GSD Benefits (Brand & Retail)

- ☐ Benchmarking Time & Cost
- ☐ Method Benchmarking
- ☐ Pre Costing
- ☐ Product Costing
- ☐ Productivity
- ☐ Design for Manufacturing

PLM vendor profiles

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 also 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 we added to these listings with counterparts for PLM consultants – those professional services organisations, large and small, who can be instrumental to implementations – and this year readers will find these complemented by profiles of leading 3D vendors. Our commitment remains, though, to painting the most accurate, comprehensive portrait of the PLM market for retail, footwear and apparel.

The following vendor profiles collect statistics and insights 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 solution for their unique requirements.

To make this shortlisting exercise simpler, this year we have 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 in the financial year 2014/15.

On the surface it may appear as though our 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.

(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, 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 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.

For those vendors that do cater to two or more different industries, 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.

Unlike previous years, vendors who offer 3D solutions in addition to their PLM product – either sold separately or bundled – have this year been given the opportunity to talk about how those solutions support their long term strategies for the future of fashion.

So while the following pages collect PLM-centric information only, readers interested in the unity of PLM and 3D within a single vendor's portfolio are encouraged to read this section and the one that follows it.

Readers of previous Annual Reviews will notice that this year's publication adopts the more detailed format pioneered in our 2014 Annual Review, presenting 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 to provide the relevant information. And although in some instances it does represent a refusal to provide information, in many cases (particularly the provision of financial information) the division between public and private companies is the cause. For this reason, “N/A” should be read as “not publicly disclosed”, since this information 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 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 2014/15 period as valid inclusions for these pages. We are happy to report that this practice occurs less and less frequently with each passing year, though, and in most of these cases the vendors in question retracted their baseless claims.

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 that follow should be considered

as an endorsement of any particular PLM vendor. Indeed, 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 either turn to our consultancy listings or 3D vendor 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.

Nothing in the vendor profiles that follow should be considered as an endorsement or assessment of any particular PLM vendor.

Adjacent to each vendor profile is a full-page advertisement provided to us by the vendor, or by a third party. WhichPLM does not control and is not responsible for the content of these advertisements.

FINANCIAL YEAR 2014/15



NEW CUSTOMERS OF RFA PLM, INCLUDING:

American Vintage | Anya Hindmarch | Bestseller Fashion Group China | Etam Group | Happychic Group | ID Group | Mascaró | Regina Miracle | Scotch & Soda | Sunrise Brands | Ted Baker | Victoria Footwear | And 23 not yet made public.



OVERALL NUMBER OF ACTIVE CUSTOMERS

of PLM within the RFA industry, excluding customers cited as new in 2014/15.



TOTAL NUMBER OF INTERNAL USERS WORLDWIDE



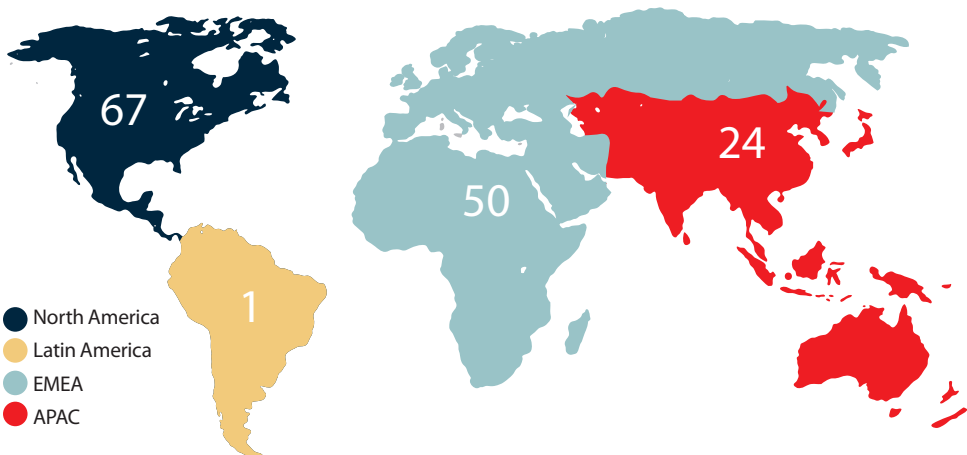
TOTAL NUMBER OF EXTERNAL USERS WORLDWIDE



NUMBER OF RESOURCES SPECIFICALLY ENGAGED IN R&D

TOTAL NUMBER OF RESOURCES FOCUSED ON THE RFA INDUSTRY BY REGION:

(Excluding those cited as R&D-specific resources above.)



REVENUE & INVESTMENT INFORMATION

Licensing revenue:

N/A

Implementation & services revenue:

N/A

All maintenance revenue:

N/A

R&D investment:

\$6-10 million

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.

First to deliver mobile apps for its solution, Centric offers the largest portfolio of apps in the industry. Always innovating, Centric introduced six mobile apps in the last year. The Product Notes app allows the user to capture product notes, images, and pricing when reviewing competitive products. The Product Share app enables users to take photos when attending trade shows or conferences, insert notes and hashtags, and share on Twitter. When looking for product inspiration, the Inspirations app allows the user to upload images to themes—and styles and materials attached to themes—storing information in Centric PLM. Sample Review helps users quickly view and edit sample and style data with easy-to-use, robust editing tools. The Fit Review app lets fit professionals take a mobile device into fit sessions, view and sort reviewed styles, and enter measurements and comments directly into Centric 8 from the device. Retail Review allows store reviewers to easily measure, analyse and encourage improvement of standards and programs in stores. Centric also introduced the Merchandise Planning module for Centric 8 that lets merchandising teams dynamically align plan targets with financial goals, compare plans with prior-year data and make changes to plans on the spot.

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.

Retailers are aggressively pursuing private label branding which requires similar operational processes to brands and the necessary enabling PLM technology. Brands are reaching directly to consumers either via retail or online experiences, necessitating increased variety of product choice by channel. Manufacturers are moving up the value chain and creating brand and retail capabilities, largely for domestic consumption. Each of these major trends benefits greatly from the adoption of PLM capabilities.

Best in Class PLM

More than 125 brands, retailers and manufacturers trust Centric when creating innovative products for their customers.

Groundbreaking PLM mobile apps.
Constantly innovating.
New Merchandise Planning.
Agile DeploymentSM delivers fastest ROI.



RETAIL. APPAREL. FOOTWEAR. LUXURY.

CENTRIC SOFTWARE

485 Alberto Way | Suite 200 | Los Gatos, CA 95032 USA
E centric@centricsoftware.com | T +1.408.574.7802 x 204
CentricSoftware.com

FINANCIAL YEAR 2014/15



NEW CUSTOMERS OF RFA PLM, INCLUDING:

LF Corp | Mynta | And 6 more that are not yet subject to public disclosure.

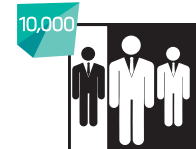


OVERALL NUMBER OF ACTIVE CUSTOMERS

of PLM within the RFA industry, excluding customers cited as new in 2014/15.



TOTAL NUMBER OF INTERNAL USERS WORLDWIDE

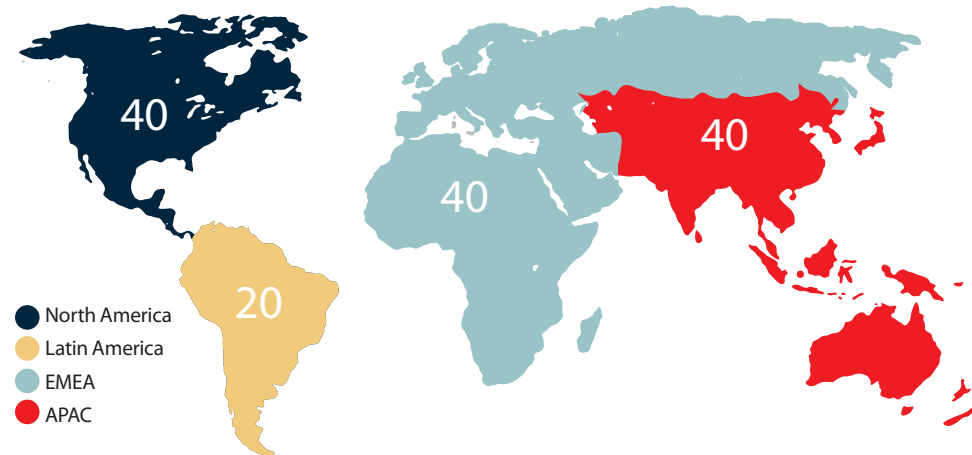


TOTAL NUMBER OF EXTERNAL USERS WORLDWIDE



NUMBER OF RESOURCES SPECIFICALLY ENGAGED IN R&D

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



REVENUE & INVESTMENT INFORMATION

Licensing revenue:

\$5-7 million

Implementation & services revenue:

\$5-7 million

All maintenance revenue:

\$8-10 million

R&D investment:

N/A

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' 2-way integration between our core PLM and Adobe Illustrator provides a best in class ability for Designers to work in their preferred creative environment while leveraging the power of PLM. Designers have full access to centrally managed libraries for materials, colours, trims, finishes, and more. They can create a variety of Design Briefs in Adobe and, when ready, populate their work into the appropriate areas of the PLM system (libraries, seasonal collections, products, placeholders, BOM, etc). Key updates within ENOVIA can also be synchronised back into Adobe.

Overall our solution is also more visual and intuitive than any prior release based on significant enhancements in the User Interface with more 'drag-and-drop' and visual cues. Customer response has been very positive.

We've also added more elements to support multi-category business models so our customers can manage their range of products in one environment. This provides better executive visibility on calendar status or seasonal versus category margins. We provide the same strong support for omni-channel and global sales so our customers can manage product, collection, delivery and pricing variations within one environment.

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.

Fashion companies want to inspire their consumers through innovative 'experiences' increasingly comprised of products and environments incorporating a 3D digital strategy with their current PLM infrastructure. Our goal is to provide leading capabilities in digital continuity for product innovation and experience from concept to consumer, accelerating business value. Today PLM is largely used by product development and sourcing; designers and merchants often don't see the same level of benefits. What if we could improve visual collaboration with 3D design solutions intuitive enough to inspire creative designers? If we leverage 3D assets to overcome delays iterating through physical samples? If we beautify those design assets into marketing assets and go immediately from concept to commerce? What if we transform points of sale into spheres of experience? And finally what if we leverage this virtual and visual assortment at all points of interaction to reveal the full range of available and optional (customisable) consumer choices, increasing consumer choice while actually reducing inventory? Our first objective is to streamline product innovation for upfront design and re-use design assets for sales and marketing. There are tremendous cost savings in sample reduction as well as tremendous time savings linking digital design to digital retail.

IF WE want exclusive style, can our home become a fashion house?

The 3D virtual shopping experience – a dream our software could bring to life.

Innovative thinkers everywhere use INDUSTRY SOLUTION EXPERIENCES from Dassault Systèmes to explore the true impact of their ideas. Insights from the 3D virtual world are unlocking new shopping experiences that bring consumers and designers closer together. How long before the living room and the fitting room become one?



3DEXPERIENCE

It takes a special kind of compass to understand the present and navigate the future.

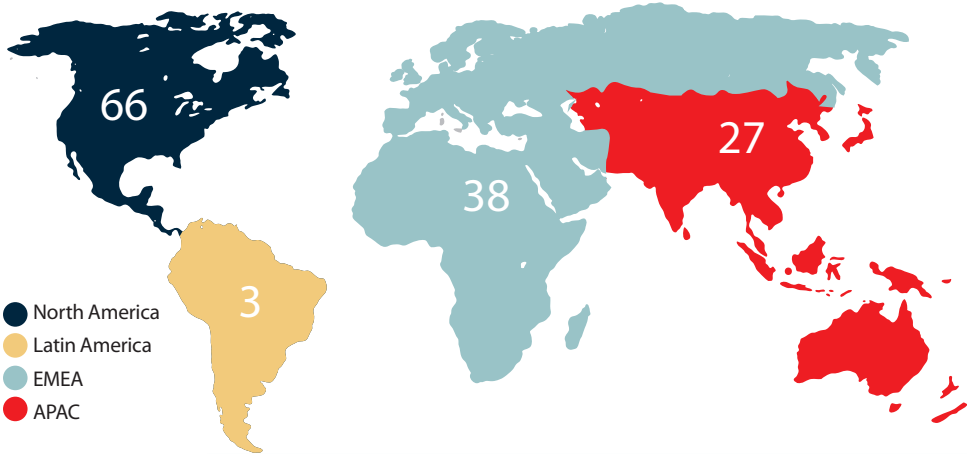
Our partner: Julien Fournié

3DS.COM/CONSUMER-GOODS

FINANCIAL YEAR 2014/15



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



REVENUE & INVESTMENT INFORMATION

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

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.

Over the past year we've released a redesigned Line Planning Module, Development Calendar, Mass Sample Management Tool, and Digital 3D File Integration/Support with AccuMark 3D. Our line planning function centralises all of the information needed for a season and makes it accessible for collaborative review by every department involved. Build your hierarchy, develop your Financial / Merchandising goals, Colours & Materials versus what is being used, storyboards, auto generate products based on your plans and track them through the entire process, with notifications of critical activities. We also released a calendar tool that allows a client to manage non-PLM events like line review meetings to individual tasks within YuniquePLM. interface, drag and drop and auto syncing capabilities. We've also expanded our digital solution by building in an integration with the recently released AccuMark 3D. Allowing clients to digitally sample garments and make annotations against 3D files without needing any special cad software. Another thing that sets us apart is the release of our YuniquePLM TestDrive. This allows potential clients the ability to start a trial version of YuniquePLM for free. The trial version has been successful and will be looking to further evolve into other areas in 2015/2016.

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.

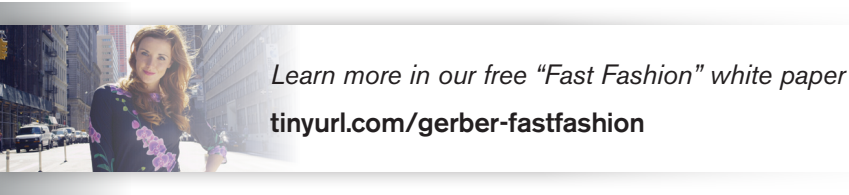
Major trends have emerged that will ultimately influence the shape of the industry in the years ahead; including 3D visualization, cloud computing, mobile computing, and integrated hardware and software systems. The rapid explosion of data coming from various software platforms, internet services, and mobile computing, has enabled for better process visibility throughout product development and the supply chain: in addition, more data and information enables better decision making in merchandise and assortment planning. One of the hottest frontiers in technology is the Internet of Things (IoT), which networks physical objects and systems together and enables them to exchange information. This technology can connect design, development, sourcing and now the manufacturing floor. Continuing with the theme of connectivity, PLM will be better able to fully connect with various design tools and business systems like ERP to further streamline the supply chain. In the past, PLM was feasible for only large companies, but now it is made possible for companies of all sizes through out-of-the-box instances and cloud computing making it cost effective and infinitely scalable. 3D CAD and 3D printing continue to evolve at an ever-increasing pace; this is transformative technology that can help companies save significantly on time and cost.



REACH YOUR
OPTIMUM.

Get total visibility into your line planning and development calendar with Gerber Technology's YuniquePLM™ software. The hub of our integrated solution, YuniquePLM's comprehensive functionality provides valuable insight into all stages of the fashion value chain.

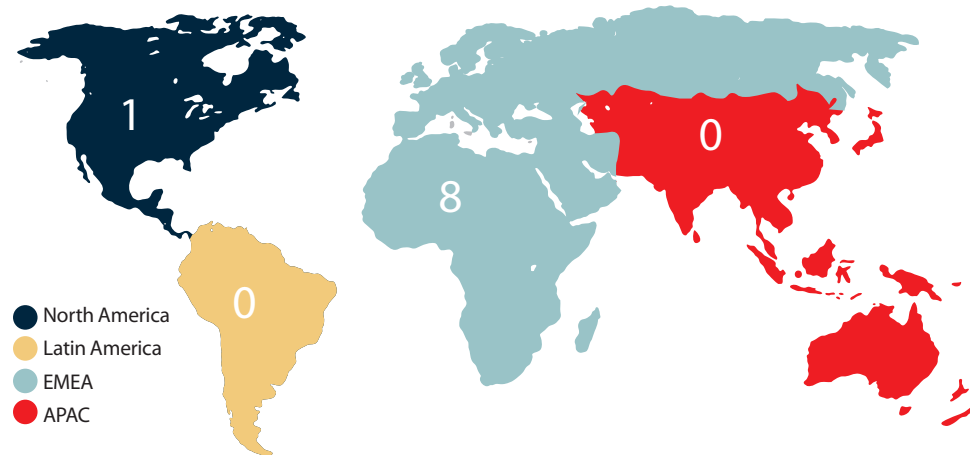
See the whole picture with YuniquePLM.



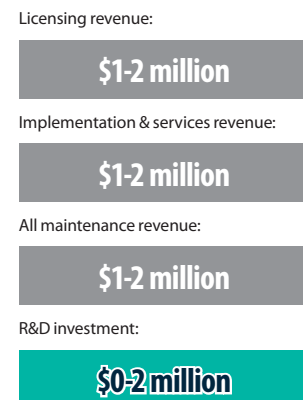
FINANCIAL YEAR 2014/15



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



REVENUE & INVESTMENT INFORMATION



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.

We have made PLM GoLive faster, redesigned Bill Of Material and integrated a Reporting Tool and a SCM Solution. Above all, we have developed our new fashion apps "Dashboard", "Product catalogue" and "Snapshot".

PLM GoLive has a consistent and proven reference process for apparel development.

A company only has to change what's really important for the individual process.

As a standard system, PLM GoLive exploits technical innovations with every release - the system is always future-proof and combines many Human Solutions Group technologies, so there are no extra outlays. These include Cad.Assyst, ERP BOS, Vidya and iSize.

And we offer global flexibility: PLM GoLive is available as a local, a remote and a web client. This makes it available anywhere and anytime - and the user decides who accesses what. Program and data can be hosted in the Human Solutions Cloud, in your private Cloud or by network.

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 whole fashion industry is moving faster and faster - companies have to deliver their goods at shorter intervals. Apps, the integration of technologies, people from different parts of the world collaborating on one project, quality assurance and creative design, all of these become more and more important.

We see PLM systems as a process and data guarantee. And the better this system manages and distributes your product data, the more economically a company can work. That's why PLM GoLive combines all process elements, integrates central tools like CAD, 3D with Vidya and ERP, helps to optimally organise daily operations and gets all the data and files to where they're needed. It's also a valuable tool for translating strategy into practice. PLM GoLive is a control centre if you want to be faster to market, increase product quality and reduce costs.

How does the future look? PLM is the backbone of the development process and instantly provides a seamless process (also in the Cloud upon request), from the first draft to the store - a process which every company can freely customise. Employees, locations and partners are all flexibly linked.

Pure Fashion. Pure Fashion PLM.

PLM GoLive - from collection framework planning to production

This is how PLM should be - right at the heart of your collection development with a full reference process and with amazing potential for your business in terms of costs, time and quality.

Manage your data



Variants, files, lists
 Men, women, children
 Outward processing/full purchase

Accelerate your processes



Wide functionality
 Workflow automation
 Integration - from CAD to ERP

Collaborate worldwide



Desktop, Web, Cloud
 Multi-brand, multi-lingual
 Integration of teams, sites, partners

NEW: Fashion Apps
Dashboard, Product Catalog, Snapshot



FINANCIAL YEAR 2014/15



NEW CUSTOMERS OF RFA PLM, INCLUDING:
None that are yet subject to public disclosure.



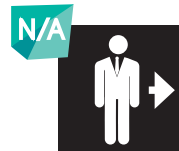
OVERALL NUMBER OF ACTIVE CUSTOMERS
of PLM within the RFA industry, excluding customers cited as new in 2014/15.



TOTAL NUMBER OF INTERNAL USERS WORLDWIDE

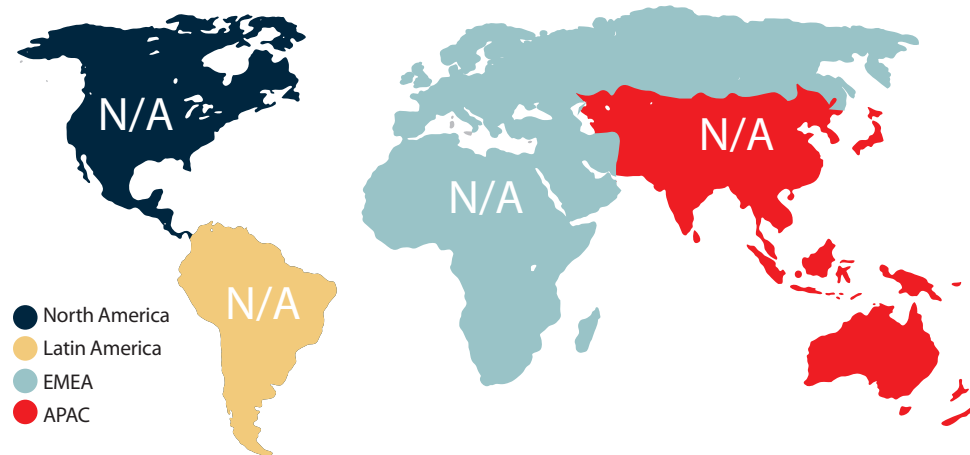


TOTAL NUMBER OF EXTERNAL USERS WORLDWIDE



NUMBER OF RESOURCES SPECIFICALLY ENGAGED IN R&D

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



REVENUE & INVESTMENT INFORMATION

Licensing revenue:

\$1-2 million

Implementation & services revenue:

\$1-2 million

All maintenance revenue:

\$1-2 million

R&D investment:

\$0-2 million

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 latest delivery of Infor Fashion PLM creates the foundations for faster work, greater flexibility and a superior user experience. This latest version is designed to help improve speed and collaboration from merchandise planning to partner collaboration and includes: 100+ enhancements that enable users to better plan collections and develop styles; new features to support the creation and management of packs; Merchandising Planning supporting new processes for multi-level planning and period management; an extension for Adobe Illustrator Creative Cloud that supports designers to create styles and upload the images to Infor Fashion PLM from their Adobe application, and the capability to create purchase orders for samples, directly from the system.

Designed in partnership with Hook & Loop, Infor's in-house design agency, it includes a Collaboration Toolbox which empowers creative, technical and commercial teams to work efficiently together. Integration to other systems is made easy via Infor ION and XML. Infor Fashion PLM is designed to be intuitive to use, so speeds up user adoption and reduces training requirements. It includes a configurable user home page and driven processes which provide a new level in user experience and greater efficiency in daily activities.

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 thrives on innovation. New product introductions are critical to business success, but only half of them achieve the profit objectives set before launch. To improve the ratio of hits to disappointments, it's essential to listen to the consumer and collaborate with the supply chain. Collaborating more closely with consumers can be a game changer for fashion value chains, with new strategies, opportunities and a fashion-forward influence for consumers to believe in. The consumer sets the bar for value and the supply chain determines whether you meet or miss it. The next decade will call for significant materials and process innovations at both the micro (product) and the macro (enterprise, supply chain, and industry) level. At strategic planning levels, the industry must figure out how to convert to more sustainable ways of doing business, starting with raw materials and R&D, and expanding PLM practices to include recycling. At the operational level, the fashion industry needs to rethink the way they work internally and collaborate with supply chain partners to eliminate waste throughout the value chain. Innovations arise at every stage, when all the partners can see the value chain as a whole.

Create exciting fashion, faster



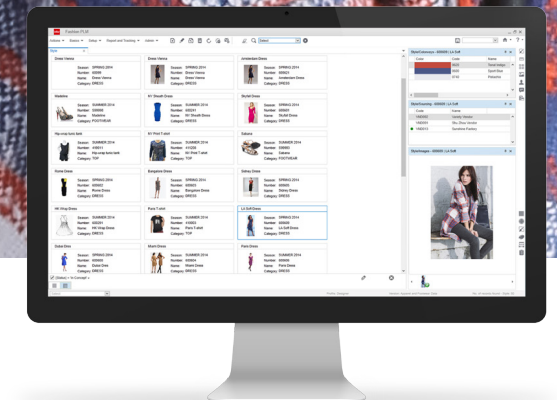
Innovate



Accelerate



Collaborate



With the intuitive, beautifully designed Infor Fashion PLM, you can turn inspirations into products and first-time customers into brand enthusiasts.

- Exploit product innovation and drive profitable sales growth
- Develop the right collections and styles more quickly and satisfy customers sooner
- Bring creative, technical, and commercial skills closer together



Fashion PLM

infor.com/fashion

@InforFashion

FINANCIAL YEAR 2014/15



NEW CUSTOMERS OF RFA PLM, INCLUDING:

TMC Clothing | Veldhoven | And 1 more that is not yet subject to public disclosure.



OVERALL NUMBER OF ACTIVE CUSTOMERS

of PLM within the RFA industry, excluding customers cited as new in 2014/15.



TOTAL NUMBER OF INTERNAL USERS WORLDWIDE

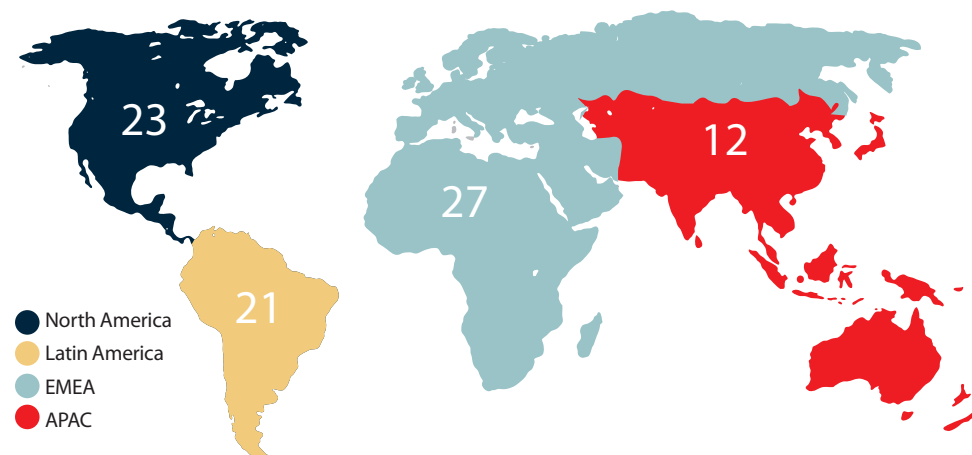


TOTAL NUMBER OF EXTERNAL USERS WORLDWIDE



NUMBER OF RESOURCES SPECIFICALLY ENGAGED IN R&D

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



REVENUE & INVESTMENT INFORMATION

Licensing revenue:

\$1-2 million

Implementation & services revenue:

\$3-4 million

All maintenance revenue:

\$1-2 million

R&D investment:

\$0-2 million

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 optimisation of our PLM solution TEX-DEFINE™ is an ongoing process which involves close cooperation with our clients and is always at the cutting edge. Last year's focus, for instance, was primarily on the improvement of the PLM user interface, both as regards the use and the appearance of our solution. Koppermann enjoys unique ties with the world of textiles and thus understands the demands designers make on visual appearance and aesthetics. The technological side saw a further streamlining of the data transfer process through the use of web services, while Koppermann's matchless portal technology was established across the board to ensure a seamless system integration of our PLM solution. The dedicated use of mobile end devices and photo apps was also further enhanced, as was the actual PLM application itself, for an industry-specific patterning and trend analysis. This is all an expression of Koppermann's long-term commitment to individual workflow management, global process integration and the most sophisticated web technology without forcing companies into a software straitjacket. Our clients and partners thus profit from our comprehensive industry know-how, our in-house software development "made in Germany" and our direct and personal services and consultation work.

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 are naturally in direct communication with our clients and partners to swap ideas and also keep a very close eye on the current market developments. We see the topics of global communication and workflow optimisation as the biggest development area in the next 12 months. The focus is therefore on networking and communications between all players in the creative development process. An increasing globalisation has in particular become indispensable in the production sector to keep up with the constant competitive pressure. Koppermann has therefore always used web-based PLM applications, together with the integration of mobile solutions, to give our clients the support they need in their collection development.

A seamless monitoring of the total supply chains of the textile process also represents a challenge for our clients - particularly in times in which the demand for the sustainability of clothing and its production has formed the focus of the public eye. The streamlining of the collection development and of the patterning process in particular requires intense and permanent controls. We focus here on full transparency, a uniform provision of information and effective quality management. We have also pinpointed huge potential in efficient collection planning through PLM controlled visualization.

Product Lifecycle Management for the Fashion Industry & Retail

...Latest Technology and unique Flexibility

...WEB Technology

...Process Control

...Global Communication

...Collection Planning

...Mobile Solution

FINANCIAL YEAR 2014/15



NEW CUSTOMERS OF RFA PLM, INCLUDING:
Brioni | Dixie | Petit Bateau | New Twins |



OVERALL NUMBER OF ACTIVE CUSTOMERS
of PLM within the RFA industry, excluding customers cited as new in 2014/15.



TOTAL NUMBER OF INTERNAL USERS WORLDWIDE

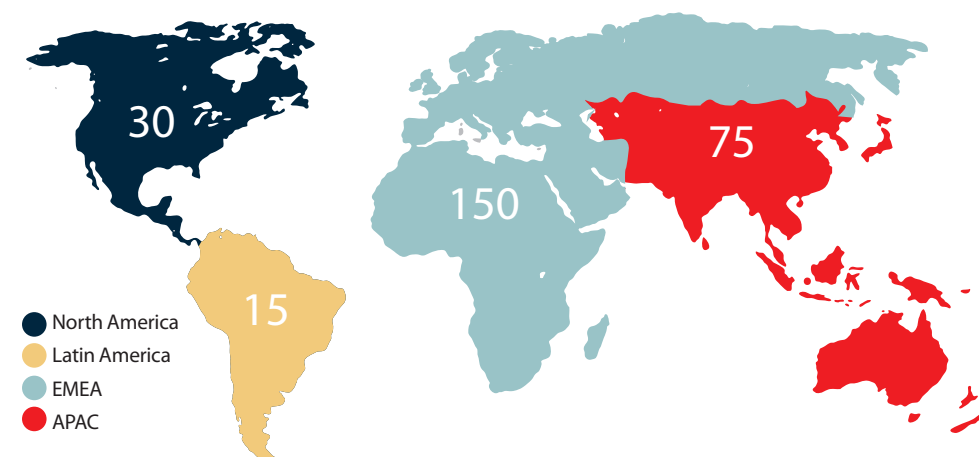


TOTAL NUMBER OF EXTERNAL USERS WORLDWIDE



NUMBER OF RESOURCES SPECIFICALLY ENGAGED IN R&D

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



REVENUE & INVESTMENT INFORMATION

Licensing revenue:

\$1-2 million

Implementation & services revenue:

\$3-4 million

All maintenance revenue:

\$3-4 million

R&D investment:

\$11-20 million

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.

After numerous projects and interactions with Lectra's closest customers over the past few years, Lectra has completely changed its way of thinking about PLM. The new Lectra Fashion PLM is based on over 40 years of expertise, a solid approach and advanced technologies. These three pillars – expertise, approach and technologies – are necessary in order to support our customers in their deep transformation needed to remain competitive over the long-term. With Lectra Fashion PLM, fashion companies can build better products faster while boosting overall business performance. Lectra has the experience to address a modern fashion way of working and offers a pragmatic project methodology based on best-in-class practices to ensure that change is accepted and sustainable. Lectra Fashion PLM enables companies to leverage the overall value chain from design to sourcing to ensure maximum control over product quality, cost and timing. Adopting Lectra Fashion PLM means there will be significant changes to organisations, processes, and systems. Lectra Fashion PLM's strength lies in 40 years of expertise embedded in a platform and fashion-specific business applications such as design, pattern making and marker making, Lectra's experience in change management serves as a valuable framework throughout the entire transformation phase and project implementation.

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.

Cloud computing, customer experience, data intelligence, mobility, 3D and the IoT are the most important trends for the near-term future. Companies are still thriving to streamline their processes – including the pre-production and production ones which involve different partners. They want to reduce IT investments, thus embracing cloud and software-as-a-service offers. In addition to their regular product offer, brands and retailers will also want to manage similarly their made-to-measure and personalised product offer (aimed at providing their clients with a richer and unforgettable customer experience), and as most of them go beyond apparel products, their leather goods & accessories product offer. Data collected all along the processes will enable informed decisions at the different steps of the lifecycle. 3D will continue its deployment in the different processes addressed by PLM. Some of the above-mentioned processes involving professionals who are not necessarily on premises, mobile access to PLM and mobile applications will be required. Finally, the IoT will be one of the major assets of tomorrow. Lectra will significantly develop its Smart Services offer, which it pioneered in 2007 in order to optimise cutting room usage but also to establish and provide best practices for all types of production and materials.

MAKE CHANGE A SUCCESS

LECTRA FASHION PLM

// TECHNOLOGY //



// APPROACH //



// EXPERTISE //

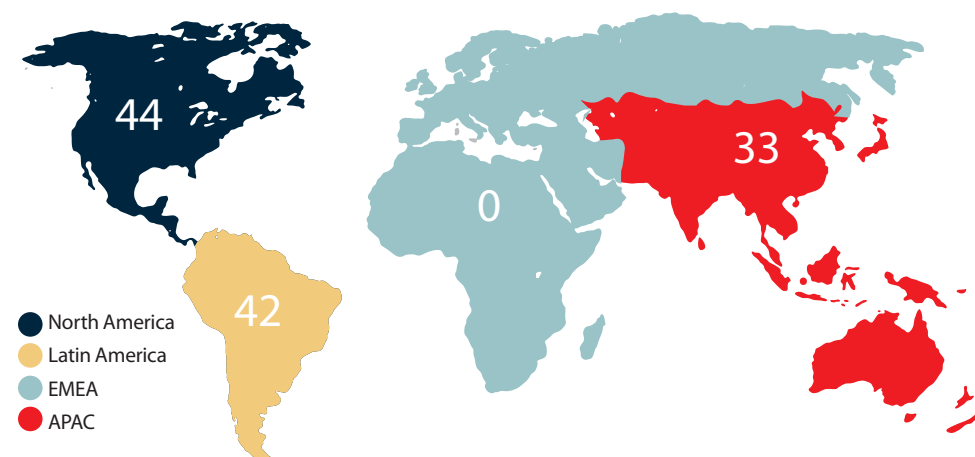


The growing complexity of the fashion industry has forced companies to transform from their traditional business models in order to remain both innovative and competitive. Adopting Lectra Fashion PLM is a change initiative that enables companies to continuously develop products that appeal to consumers. By improving design to production teamwork, fashion companies can build better products faster while boosting overall business performance.

FINANCIAL YEAR 2014/15



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



REVENUE & INVESTMENT INFORMATION

Licensing revenue:

\$11-20 million

Implementation & services revenue:

\$11-20 million

All maintenance revenue:

\$8-10 million

R&D investment:

\$6-10 million

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 depth of NGC's PLM offering continues to differentiate NGC from other RFA PLM providers, and we continue to add new features and functionality throughout our PLM platform. We are currently delivering v. 14 of NGC's software, which adds a number of new enhancements.

NGC's PLM platform offers foundational capabilities that include workflow calendars, collaboration, exception alerts, custom reporting, mobility and BI dashboards. In addition to this, we are now delivering enhanced features throughout our PLM platform in areas such as Line Planning, Assortment Planning, Ideation, Tech Packs, Costing, Sourcing, Sample Management and Material Requirements Planning.

NGC has added new mobile features to our Extended PLM offering. Our customers are now conducting quality audits and factory evaluations on mobile devices, using NGC's Extended PLM. They are also scanning and receiving shipments using our mobile offerings, as well as evaluating and managing samples.

We have also incorporated store-level inventory management and store performance into our core PLM offering, which is an important requirement for omni-channel retail.

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.

PLM-as-a-Platform is the single most important technology trend that is shaping our industry. During the past year, we have seen strong support for the notion that PLM should be viewed as one of the cornerstones of a company's information technology infrastructure – and that PLM should really be viewed as a platform that integrates information, processes, systems, departments and geographies from throughout the fashion enterprise. It's the proper role of PLM within an organisation – hence, the term "PLM-as-a-Platform."

In addition to information from the PLM system itself, PLM-as-a-Platform integrates and orchestrates data from Planning and Forecasting systems, ERP, Supply Chain Management, Logistics, and other systems, depending on each organisation's needs. PLM isn't a fixed, static set of processes; it continues to expand into additional areas in product design and manufacturing – everything that is involved in bringing products to market. More than any other enterprise solution, PLM has the ability to unify information and break down the silos that typically existing in product design and manufacturing. That's why the notion of PLM-as-a-Platform is a hot topic in the industry right now and will continue to be for the foreseeable future.

ADVISORY SERVICES FROM whichPLM



Considering a PLM, 3D, or digital transformation project of your own?

The WhichPLM Advisory Services team undertakes process analysis, extended-PLM system architecture mapping, master data consolidation and scientific shortlisting and selection projects for major brands in Europe, the United States and Asia. We also support enterprise-wide digital transformations, and have helped to manage investments in 3D and other cutting-edge technologies.

Each of our associates has direct experience of multiple and varied technology implementations, and our services remain unbiased and expertly informed.

Our proven methods – born from a marriage of best practices and hands-on experience – have helped to shape the strategies of retailers and brands around the world. Customer references are available upon request.

PLM Customer Services

- Business case & ROI analysis
- Best-practice process maturity redesign
- PLM education for all levels

PLM Vendor Services

- Solution and roadmap evaluation
- Process maturity scoring
- Education of in-house or partner resources

3D Customer Services

- 3D enterprise process evaluation
- 3D selection & evaluation
- 3D education services
- 3D integration services

Digital Transformation

- Education services
- Extended PLM solution mapping
- Extended solution inputs & outputs
- Integration services

Educational Establishments

- Guest lectures on PLM, E-PLM & 3D
- PLM process landscape analysis
- Predictions for PLM & E-PLM futures
- Individual lectures available online
- Complete, accredited online courses
- ... and more available on request.



Contact advisory@whichplm.com to arrange an introductory conversation

www.whichplm.com

FINANCIAL YEAR 2014/15



NEW CUSTOMERS OF RFA PLM, INCLUDING:

Aldo | Avalanche | FN Herstal | Browning | Hasbro | LC Waikiki | Polaris | Toys R Us | Umbra | Volkswagen



OVERALL NUMBER OF ACTIVE CUSTOMERS

of PLM within the RFA industry, excluding customers cited as new in 2014/15.



TOTAL NUMBER OF INTERNAL USERS WORLDWIDE

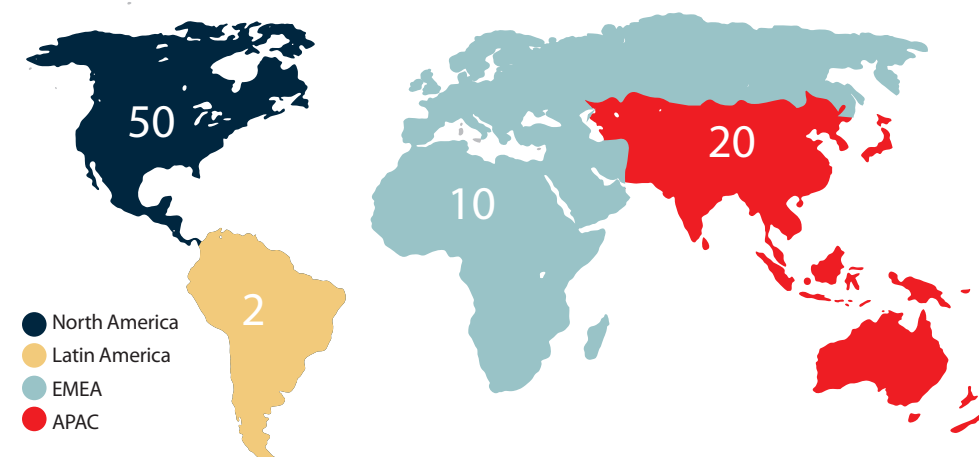


TOTAL NUMBER OF EXTERNAL USERS WORLDWIDE



NUMBER OF RESOURCES SPECIFICALLY ENGAGED IN R&D

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



REVENUE & INVESTMENT INFORMATION

Licensing revenue:

\$11-20 million

Implementation & services revenue:

\$11-20 million

All maintenance revenue:

\$11-20 million

R&D investment:

\$6-10 million

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.

Real adoption of PTC's Value-Ready Deployments and Cloud Services offerings. Retail companies' PLM expectations are increasing: faster time to value with lower TCO are common requirements now. Strong interest and adoption of our VRD offerings - including process guidance, best practices & configurations to quickly achieve business value - combined with our Cloud Services offering proves we have a winning combination. Example: Marks & Spencer - leveraging VRD as the basis for an implementation that covers their complete General Merchandise business and supply chain via PTC Cloud Services. **Comprehensive PLM for all product categories and levels of development complexity.** PTC's Retail PLM solution is the only solution that can manage not only all soft goods product categories, but also all hard goods categories. Capabilities include features to plan a portfolio / assortment of products, design, develop, engineer, source, and cost all goods. Product development and engineering features include 3D design, native CAD integration across multiple CAD tools (ex. Solidworks, Creo), and a unified hard goods / soft goods BOM. Scalable, Performant, and Secure PLM. PTC has stringent validation processes ensuring performance and security. Each release the past 4 years has gotten faster (lower response times) and is tested for vulnerabilities by an independent security firm (VERACODE).

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.

Adoption of Internet of Things (IoT) technology will increase, helping retailers provide better consumer experiences and gain deeper retail performance insights. Retailers will realise IoT technology can be deployed quickly to connect systems (e.g. POS, CRM) and devices / sensors (e.g. RFID tags, video systems) to aggregate data and derive patterns / insights from the data. Actionable information from IoT technology can help retailers make better decisions during planning and design/development within PLM and optimise their supply chain. Omni-channel delivery is a must-have for retailers seeking to maintain consumer loyalty. Effective inventory management is key to meeting delivery challenges. However, PLM's importance to an omni-channel strategy will increase as retailers look to plan, develop, and cost for omni-channel earlier in the development cycle. Supply chain collaboration will increase and deepen. Retailers are seeking to shift more design and development work to their suppliers to leverage their expertise, be more productive, and reduce cycle time. Supporting varying levels of supplier collaboration - from sampling to supplier-created products and product specs - will be critical PLM capabilities.

PTC Windchill® FlexPLM®: The Retail, Footwear, Apparel and Consumer Products Solution

PTC has delivered proven best practices, realized value and leading technology to two-thirds of the world's top retail, footwear and apparel companies.

Business processes we cover include:

- Merchandise line planning
- Integrated 2D and 3D Design
- Full product specification development
- Materials management
- Global sourcing and costing
- Predictive calendar management
- Quality and environmental compliance
- Packaging, artwork, and labeling management

Learn more about PTC Windchill FlexPLM at:
PTC.com/go/retail



FINANCIAL YEAR 2014/15



NEW CUSTOMERS OF RFA PLM, INCLUDING:
Alinéa | Carpisa | Marni | North Sails | Sephora |



OVERALL NUMBER OF ACTIVE CUSTOMERS
of PLM within the RFA industry, excluding customers cited as new in 2014/15.



TOTAL NUMBER OF INTERNAL USERS WORLDWIDE

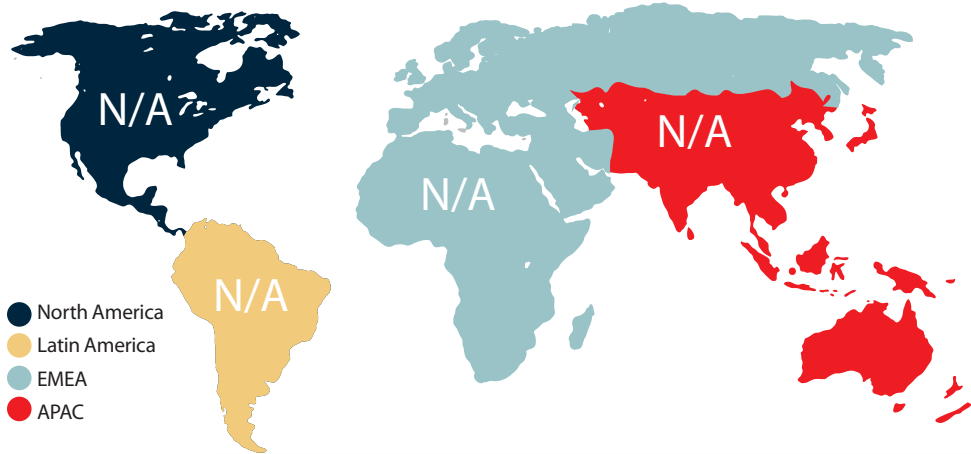


TOTAL NUMBER OF EXTERNAL USERS WORLDWIDE



NUMBER OF RESOURCES SPECIFICALLY ENGAGED IN R&D

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



REVENUE & INVESTMENT INFORMATION

Licensing revenue:

N/A

Implementation & services revenue:

N/A

All maintenance revenue:

N/A

R&D investment:

N/A

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.

TXT's PLM continues to provide a truly end-to-end solution, which is unique in the market. Many major retailers are beginning to recognise the large benefits available, in terms of flexibility, cost, efficiency, but most importantly reactivity, through the integration of core PLM capabilities with Merchandise and Assortment Planning (TXTPlanning), and Supply Chain Collaboration (TXTChain). All parties in the collaborative chain work from a common understanding. Not only does this result in balanced collections, minimised reworking, optimised quality, faster concept to cash times, but also, the value of effective in-season reactivity to a changing market, proves to be the greatest benefit for many retailers. A significant volume of TXTPLM licenses and services results from expansion of existing implementations, proving that TXTPLM grows with the business and supports the extension of the business-model to new lines, geographies and channels. Strong commitment to innovation: TXTPLM uses the latest Microsoft technology to bring further improvement to functions and performance. Its mobile capabilities are used to communicate details to Store Teams. In-memory engines are used to process/update Assortment Planning data to provide effective PLM-Assortment Planning integration. Our long experience in the sector has enabled the creation of AgileFit templates which support rapid implementations.

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.

Integrated Planning and PLM is now recognised as the key element of Retail end to end solutions: TXT's vision of an integrated and agile solution, where planning, development and supply chain collaboration are closely integrated to ensure the accurate planning and execution of customer driven assortments, but also the ability to react quickly to in-season market changes, is recognised as a driver of revenue and profit, and a priority for many global retailers. Product Portfolio Management within PLM: Pure retailers are continuing to look at PPM for all products. PLM must manage developed and bought goods, and strong value is seen in the ability to analyse by geographies, images, customer attributes, product attributes or the most popular price points, and feed information back into planning, creativity and development. Supply Chain Collaboration and PLM become ever closer: Essential to fashion companies is having visibility on quality, progress, as well as intercepting delays to gain reactivity from the supply network; PLM and Supply Chain Collaboration share common functions and data. The increased use of mobile is driven by factories and stores. In these very different locations, data access is driven by various devices. Mobile applications must be device independent to deliver data to these teams.



One end-to-end solution to design what sells and sell what you develop

TXT Product Lifecycle Management

Design, Collection Development, Costing, Quality Assurance, Calendar Management

Integrated Line and Retail Planning

Advanced Collaboration and Sourcing

Mobile technology: the right user, to the right data, at the right time

TXT PLM is end-to-end. Its unique value is the ability to extend core PLM capabilities such as Creative design, Collection Development and Costing not only to Sourcing and Vendor Collaboration, but seamlessly to Line and Retail Planning.

Designers benefit from tangible insights into market demand, business and strategic goals right from the earliest phases to better "design what sells". Planners can associate visuals to the numbers, and define and specify the best assortments that "sell what has been developed".

- All functional business roles on the "same page"
- Collections that balance the creative and business perspectives
- Minimized reworking, faster time to market

TXT Retail is a leading provider of end-to-end PLM and Planning solutions for Fashion, Luxury and Footwear
For more information: www.txtretail.com

FINANCIAL YEAR 2014/15

11



NEW CUSTOMERS OF RFA PLM, INCLUDING:

Jesta | Krazy Kat | Layette Minimome | Loomstate | Nation Design | Natural Life | Seasalt | Studio One | And 3 more that are not yet subject to public disclosure.

45



OVERALL NUMBER OF ACTIVE CUSTOMERS

of PLM within the RFA industry, excluding customers cited as new in 2014/15.

4,000



TOTAL NUMBER OF INTERNAL USERS WORLDWIDE

1,400



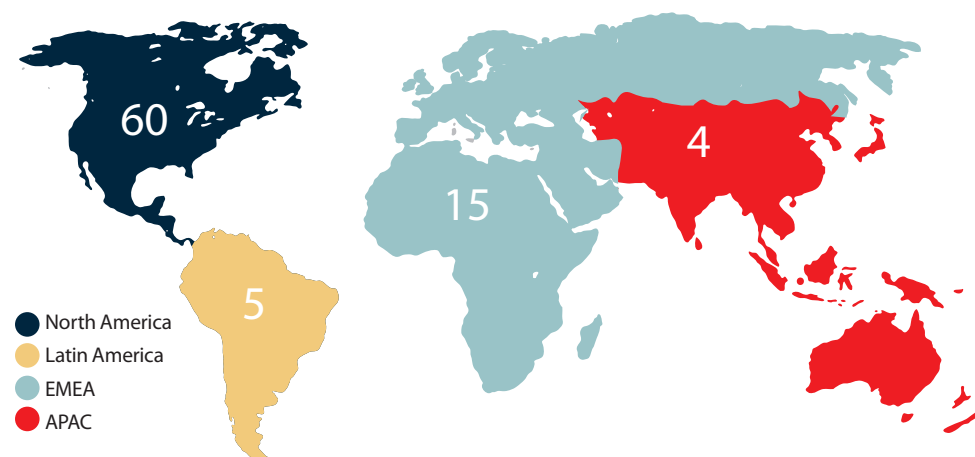
TOTAL NUMBER OF EXTERNAL USERS WORLDWIDE

17



NUMBER OF RESOURCES SPECIFICALLY ENGAGED IN R&D

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



REVENUE & INVESTMENT INFORMATION

Licensing revenue:

\$1-2 million

Implementation & services revenue:

\$1-2 million

All maintenance revenue:

\$3-4 million

R&D investment:

\$0-2 million

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.

Throughout the past year, the Visual PLM.net development team has focused on increasing workflow speed, expanding integrations and app mobility. Our powerful Adobe Illustrator plugin was re-written to enable seamless, native, two way communication. We've also included an annotation tool to make communication and collaboration easier for everyone involved. The Digital Asset Management has been re-written for pure simplicity and usability. It now allows automatic updates and the ability to drag and drop files from anywhere in Visual PLM.net. All third party software integration and data exchanges are now using native API's.

For better speed-to-market, the application now allows users to create products by simply dragging and dropping images into a folder to automatically create a tech pack. The Smart Copy function helps create products faster by remembering and reusing previously entered data. The search and view functionality has also been enhanced to allow mass updates to multiple products in one click. When mobile, users can quickly snap a picture to create a product from their device. QR codes have also been implemented for sample tracking and QC.

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.

Visual 2000 envisions PLM becoming the backbone of the apparel enterprise, thanks to its ability to breakdown departmental data flow and communications.

We predict that PLM will become completely mobile and device agnostic. Mobility, as we've already seen with the majority of our daily tools, will facilitate data sharing and data access across all platforms. Digital Asset sharing across the enterprise will close the gap between PIM, CMS and PLM to include all format types.

The main trend this year, 3D, will evolve quickly as companies try to cut back on prototyping costs and enhance speed-to-market. Expect to see these capabilities become native to PLM systems. Wearable technology will empower PLMs with new data collection capabilities and analytics. This key information will be used by PLMs to support and aggregate results while enhancing the development process.

Elegant. Integrated. Automated.



Book Your Demo & Discover our World-Class PLM

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sales@visual-2000.com

Consultant profiles

THE GOAL OF THIS REPORT (AND THE ANNUAL REVIEWS THAT PRECEDED IT) IS TO PROVIDE VENDORS AND CUSTOMERS ALIKE THE INFORMATION THEY NEED TO SHAPE THE FUTURE OF PLM AND EXTENDED PLM TECHNOLOGIES FOR RETAIL, FOOTWEAR AND APPAREL.

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 the PLM platforms themselves.

This trend has been supported by our market analysis: customers of core PLM in the fiscal year 2013/2014 proved twice as likely to solicit expert help than in the previous year, and this year's statistics reveal further growth (around 10%) in customers' using a consultant or advisory practice to develop their ROI analysis or to coordinate customer reference calls.

Coupled with the mounting pressures of post-implementation support and change management that face any business seeking to explore the full potential of PLM, these figures are the reason that, for the second year running, we 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 perception of their roles within a rapidly-changing industry.

The following pages collect profiles of proven consultancy practices – offering services from selection and implementation, to change management, training and support.

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.

“Depending on their history, available resources and industry experience, an advisor may offer different services.”

It is vital for customers to remember, then, that not all consultants are equal – and we are happy to report that a better informed market is already beginning to hold its advisory partners to the same standards as its PLM suppliers.

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. Indeed, we note that several renowned international firms have opened apparel PLM practices and begun upskilling new resources since this time last year. Although these expanding practices can (and often do) also hire experienced apparel PLM experts to help establish their operations, a period longer than twelve months is still required to build the kinds of methodologies, tools, and process frameworks that 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. It is important for customers to make the distinction between these broad strategic services and the kind of detailed knowledge that a specialist will have of the extended product development landscape.

Whatever their size, 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 having a preference for 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.

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 the results of this year's PLM customer survey reveal, vendors' internal resources – for pre-sales, sales, technical demonstration, implementation and change management – are being stretched by multiple concurrent implementations, 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 previous, 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 customer or vendor partner.

“Whatever their size, customers should exercise caution when it comes to locating a truly independent and impartial advisor.”

As with our PLM and 3D 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 for the content of advertisements that appear adjacent to these profiles.

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 optimise the end-to-end innovation and product development process for retail, footwear & apparel (RFA) clients. Our services span a progression from PLM assessments, to strategy, to process and organisation alignment, to requirements definition and selection, and through implementation planning and execution. These services can be delivered independently or with a strategic PLM solution partner. We are vendor agnostic and work with any PLM vendor that best suits our client's needs. In RFA PLM we have collaborated with Oracle, PTC, Dassault, Centric and TradeStone based on market fit and demand.

LIST YOUR IMPLEMENTATIONS OF RFA PLM ACCOMPANIED BY THE NAME OF THE SOLUTION THEY CHOSE WHERE THIS IS PUBLIC INFORMATION.

Kalypso does not publicly share client names. At Kalypso, our team has conducted over 100 PLM implementations across numerous industries. More specifically, we have helped numerous RFA clients tackle significant PLM issues and opportunities, including:

- PLM transformation/implementation for hardlines and softlines for an international toy and children's 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.
- Multi-year, multi-brand, global PLM transformation implementation for \$3B+ apparel and accessories manufacturer/retailer.
- Multi-year, multi-brand, global PLM transformation for a \$70B+ do-it-yourself retailer.
- PLM transformation/implementation and managed services for a \$3B+ apparel and hardlines catalogue retailer.

WHAT DO YOU CONSIDER YOUR PRACTICE'S STRATEGIC, TACTICAL AND IMPLEMENTATION STRENGTHS TO BE?

We help RFA clients develop dramatically improved, scalable and sustainable capabilities throughout the merchandise and product development lifecycle in order to become more innovative and differentiated in the market. We do this by developing vision, strategy, justification and roadmaps; by operationalising these strategies into efficient processes and organisations; and by enabling them through industry leading technologies. We are particularly valuable to clients who are seeking to transform their product development capabilities by making significant simultaneous improvements to process, technology and organisation. Many of our recent engagements have focused on helping clients move disparate brands, categories (e.g. softlines and hardlines), divisions, functions, and/or geographies to a common set of processes and unified PLM platform.

Tactically, we work at the client site, side by side with key executives and PLM vendors. In addition, we employ proprietary, industry-specific methodologies and tools, such as databases for requirements, use cases and business cases, process models, a best practices continuum and our Rapid Results implementation methodology.

HOW MANY RFA PLM EXPERTS DO YOU HAVE ON A GLOBAL LEVEL, AND WHERE ARE THEY DISTRIBUTED?

North America – 150+, including resources located in our Monterrey, Mexico near-shore technology centre.
Latin America – We serve Latin America from our US/Mexico geographical centres.
EMEA – 30+, including a near-shore technology centre in Hamburg, Germany.
APAC – Our resources in APAC primarily face off against the Asia based operations of our clients from North America and EMEA.

WHAT DO YOU SEE AS THE TWO MOST IMPORTANT EMERGING TRENDS IN RETAIL, FOOTWEAR AND APPAREL?

- Realizing the promise of building world class store brand / private label programs, brands and merchandise
- Creating a closed loop system that links innovation and advancements occurring in digital marketing engagement and seamless omni-channel operations with innovation and advancements occurring in the merchandise and product development lifecycle.

VIEWPOINTS ON INNOVATION

VIEWPOINTS ON RETAIL viewpoints.io/retail

Retail companies that thrive in today's challenging consumer spending environment are those that create true differentiation through innovation. Join the conversation for retail-focused inspiration, discussion and advice, designed to help maximize the value of innovation initiatives.

Top Six Things Retail Executives Need to Know About PLM Transformation

by Vipin Goyal and Steve Riordan

read more at kalypso.com/sixthings

Bright Lights, Big Retail Innovation: PI Apparel Event Debrief

by Amy Kenly

read more at viewpoints.io/brightlightsbigretail

Infographic: The Internet of Things in Retail

by Andy Timm and Steve Hurst

read more at viewpoints.io/iotinretail

Success Story - PLM Transformation in Hardlines

by Vipin Goyal

read more at viewpoints.io/homedepot

Driving Business Impact from Retail Innovation Labs

by Charisse Jacques

read more at viewpoints.io/innovationlabs

Apparel Manufacturing Outsourcing: Product Innovation Opportunities

by Vipin Goyal

read more at viewpoints.io/apparelmanufacturing

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A **KALYPSO** PUBLICATION

WHICH PLM SOLUTIONS / SUPPLIERS DO YOU WORK WITH? IF YOUR SERVICES ARE VENDOR-AGNOSTIC, PLEASE SAY SO.

We work with the following suppliers: PTC, Gerber, Centric, Lectra, Visual 2000, Infor.

For Services we are Vendor agnostic and provide consultancy and implementation assistance for all PLM systems in the Retail, Footwear and Apparel industry.

LIST YOUR IMPLEMENTATIONS OF RFA PLM ACCOMPANIED BY THE NAME OF THE SOLUTION THEY CHOSE WHERE THIS IS PUBLIC INFORMATION.

- Mountain Equipment Co-op – 2015 – Visual 2000
- Ben Sherman – 2012/2013 – PTC
- Seasalt – 2014/2015 – Visual 2000
- Kwintet – 2012 – Gerber
- Marsylka – 2014/2015 – Visual 2000
- Tally Weijl – 2014 – Centric
- Build a Bear – 2013 – Centric
- Voice/Gresvig Sports – 2012/2013 – Lawson
- Amongst many other clients over the years who would prefer not to be publicly disclosed

WHAT DO YOU CONSIDER YOUR PRACTICE'S STRATEGIC, TACTICAL AND IMPLEMENTATION STRENGTHS TO BE?

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.

HOW MANY RFA PLM EXPERTS DO YOU HAVE ON A GLOBAL LEVEL, AND WHERE ARE THEY DISTRIBUTED?

North America: 2 + 2 freelance
Latin America: 0
EMEA (Europe, Middle East & Africa): 4 + 2 freelance
APAC (Asia Pacific): 2 + 2 freelance

WHAT DO YOU SEE AS THE TWO MOST IMPORTANT EMERGING TRENDS IN RETAIL, FOOTWEAR AND APPAREL?

- Vendor Management and the integration of suppliers in the PLM development flow. Most companies have only implemented PDM i.e. the Tech pack which is then sent out as a PDF by email. PLM requires that Workflow and the Suppliers are fully integrated in the process flow to enable an overall vision of the business.
- Ethical and Sustainability is still a major push but is taking longer to implement due to the lack of true PLM implementations, little software support and an unwillingness to bite the bullet and commit to an Ethical and Sustainable approach as it requires additional data management and resources.



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 ("PLM") environments. The PDP team is comprised of specialists in design and development, and experienced experts accustomed to working with a range of modern PLM solutions across multiple regions, throughout the extended global supply chain.



PRODUCT
DEVELOPMENT
PARTNERS

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+44 (0)7515 741852



WHICH PLM SOLUTIONS / SUPPLIERS DO YOU WORK WITH? IF YOUR SERVICES ARE VENDOR-AGNOSTIC, PLEASE SAY SO.

Ptex Solutions work with Infor Fashion PLM.

LIST YOUR IMPLEMENTATIONS OF RFA PLM 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 in 2006) - Public
 - Gini & Jony (India in 2007) - Public
 - Madura Fashion & Lifestyle (India in 2008) - Public
 - Colorplus Fashions (India - 2009) - Public
 - Peacock (UK in 2009) - Public
 - Weissman (USA in 2010) - Public
 - Club 21 (Singapore in 2010) - Public
 - Big Strike (USA in 2012) - Public
 - Courtaulds (UK in 2013) - Public
 - Darice (USA in 2014) - Public
 - Future Retail (India in 2015) - Public
 - HH Brown (USA in 2015) - Public
 - *And 14 others that are not subject to public disclosure.

WHAT DO YOU CONSIDER YOUR PRACTICE'S STRATEGIC, TACTICAL AND IMPLEMENTATION STRENGTHS TO BE?

With a decade long service in PDM and PLM for RFA, Ptex Solutions have been involved in 26 PLM projects that are Retailers, Brands, Sourcing, Manufacturing, Apparel and Footwear companies. Ptex is a software services company that focuses only in the 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.

HOW MANY RFA PLM EXPERTS DO YOU HAVE ON A GLOBAL LEVEL, AND WHERE ARE THEY DISTRIBUTED?

North America: 8
Latin America: 0
EMEA (Europe, Middle East & Africa): 5
APAC (Asia Pacific): 13

WHAT DO YOU SEE AS THE TWO MOST IMPORTANT EMERGING TRENDS IN RETAIL, FOOTWEAR AND APPAREL?

As opposed to touching upon two emerging trends, we want to focus our attention on just one. The fashion business is now moving towards the virtual world. 'Virtual Dressing' or 'Magic Mirrors' are now becoming reality; many retailers that are lead adopters of new technology have started to use oversized mirrored displays where customers can browse the styles on screen, send styles to virtual fitting rooms, and virtually try on outfits. The technology allows customers to try multiple styles without having to actually wear them.

The pictures with the virtual outfits on customers can be instantly saved on a mobile app and shared with friends and relatives, or on social media. This technology can provide a different dimension to omni-channel strategy as the styles can then be bought from the store, mobile devices or a laptop.

This could also be a retailer's dream come true as they would now start collecting data for sales analysis. Earlier it was only available from the online stores but now it can be available from physical stores too. They would have access to which styles the customers are trying in stores, if they liked them, if it is being purchased and if not then promotions could be sent to provide incentive for them to buy them.

Magic Mirrors would require style, fabric, colours and measurement information. PLM has all the required information and it can be integrated with the Magic Mirror's database so that it does not have to be manually integrated. All the new styles that are designed and manufactured can be automatically transferred from PLM to Magic Mirrors database.

It is only a matter of time for, not only lead adopters, but also other retailers to start investing in these virtual trial rooms



With more than 20 projects completed in 10 different countries, Ptex has leveraged decades' worth of experience to lead the market in apparel PLM consultancy in Asia. Working with Fortune 500 companies and small brands alike, our intimate knowledge of industry processes has helped deliver real value.

Offering advisory and implementation services through a network of more than 20 expert consultants, our vendor-agnostic team has helped retailers, private label brands, manufacturers and sourcing companies to achieve maximum return on their PLM investments through...

PLM Expertise



RFA Experience



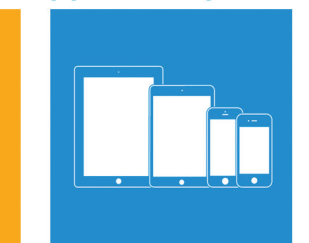
Tech. Services



Lower TCO



App Development



3D vendor profiles

EVER SINCE WE COINED THE TERM E-PLM (EXTENDED PLM), WHICHPLM'S PRINT AND ONLINE PUBLICATIONS HAVE BEEN DEDICATED TO EXPLAINING THE CENTRAL ROLE THAT CORE PLM PRODUCTS AND METHODS PLAY IN THE MODERN, MULTINATIONAL FASHION ENTERPRISE.

We have argued – and sales figures now reflect – that PLM should be considered, alongside ERP, as one of the primary technological foundations for the future of retail, footwear and apparel: international, integrated, interconnected and intuitive.

As PLM has grown to fill that role – acting as the backbone of product development for gigantic retailers and boutique brands alike, the number of different platforms, solutions and systems that it supports and interfaces to has multiplied rapidly. Developers of everything from handheld colour measuring hardware to warehouse control systems now tout their integration to PLM, and experience gleaned from our direct advisory engagements suggests that no fewer than fifty points of E-PLM integration exist within a typical Tier 1 business.

Indeed, this shift in the market's understanding of core and E-PLM was one of the primary catalysts for our building on previous Annual Reviews to create this new series of print publications – each focusing on a particular strand of the extended PLM web.

So for this Fifth Edition our research and analysis team sought to build on our long-running PLM vendor and PLM consultancy listings with an equivalent focused on the most current, vital and potentially transformative E-PLM topic: 3D.

While the editorial features that appear towards the front of this publication examine the practical and theoretical implications of 3D on tomorrow's retail, footwear and apparel landscape, the following fourteen

pages are given over to the solutions available for purchase and implementation today.

Although nothing in the profiles or adjacent advertisements that follow should be considered an assessment or endorsement of any 3D product, these are broadly-speaking mature solutions capable of delivering real results. While 3D modelling has been technically feasible – albeit only with relatively rigid products such as jewellery and handbags – for years or even decades, relatively recent advances in usability and simulation and rendering quality have bridged a gap that historically existed between non-technical users and what were at the time technically advanced but often unapproachable solutions.

“These listings are focused on the most current, vital and potentially transformative topic: 3D.”

As of the date of this publication, 3D tools – including those listed in this section – are being employed by billion-dollar brands to deliver significant, even transformative, savings of time and money in the design, prototyping and sampling process.

Likewise, maverick designers and software developers are pushing back the frontiers of what a unified 3D design and 3D print workflow can achieved, creating experimental solutions and products (footwear, eyewear, accessories and even garments) that WhichPLM believes will come to redefine fashion in the longer term.

But as the introduction to this publication explains, 3D working for fashion is not limited to designing virtual clothing and dressing virtual mannequins. The vendors who have set out their stalls over the following pages collectively offer tools designed to ease the transition from two-dimensional to three-dimensional working in a host of different areas, from product inspiration to consumer testing, collection development and virtual store planning.

As is the case with our PLM vendor and consultancy listings, suppliers appear in this section in alphabetical order, with an advertisement for their solution adjacent to profile information provided by the vendor themselves. While WhichPLM makes no assurances as to the accuracy of this information, our team sought to put to each vendor a series of questions that would allow readers to better understand not only the scope of their respective technologies, but also their perspectives on the way that 3D working can transform traditional processes.

Readers will note that several vendors – Dassault Systèmes, Gerber Technology, Human Solutions and Lectra – appear in both these 3D listings and in the section dedicated to PLM vendors. These vendors have both 3D solutions – ranging from comprehensive 3D CAD tools to virtual store planning systems – and PLM as part of their broader product portfolios.

While this technically means that these solutions should enjoy a heightened level of integration (making the adoption of PLM and 3D from a single vendor a logical choice), we remind readers that where a PLM vendor does not offer an in-house 3D solution for fashion, they may have established a productive partnership with one of the dedicated 3D vendors who populate the remainder of this section – something that may result in an equal level of mutual interoperability to their single-vendor counterparts.

As the editorial features that open this publication explain, though, 3D's potential extends beyond integration to PLM alone. In a world where

traditional online and print catalogues can be populated with high-fidelity 3D assets, and where material simulation can create results indistinguishable from reality, it is important that customers interested in making the transition to three-dimensional working understand the inputs, outputs and technical underpinnings of each solution.

Readers will find this information and more in the coming pages, and we encourage you to pay particular attention to the importance that different suppliers place on open standards.

We have also afforded each vendor the opportunity to explain what they feel sets their company (and their 3D solution(s)) apart from their competitors – a question to which we received a range of different but equally valid responses. These opinions matter because, as we have written elsewhere in this publication, 3D is only now achieving mass market recognition, and the potential remains for software developers and their customers to define the shape it will take from here.

Tied to this, we refer readers to the feature “Working In 3D”, which appears in our Editorial section, and which contains exclusive insights from retailers, brands, and boutique designers who have all made 3D an essential part of their product lifecycles.

Although these brands, retailers and designers are in many ways the vanguard leading the visible charge of 3D, credit must be given, too, to the pioneering work that every vendor listed in these pages has undertaken to turn 3D working from a niche technical interest into what we believe has become a buoyant and accessible market – one that exhibits all the hallmarks of being instrumental to the future of our industry.

“3D is only now achieving mass market recognition; software developers and their customers can still define its future.”

As with our PLM vendor and consultant 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 3D vendor or solution, and WhichPLM has no responsibility for the content of advertisements that appear adjacent to these profiles.

NUMBER OF YEARS ACTIVE IN THE RFA INDUSTRY:

Browzwear has been supplying solutions to the apparel industry since 2002.

HEADQUARTERS & OTHER ACTIVE OFFICES:

Browzwear's head office is in Singapore; R&D centre in Tel Aviv & sales office in USA.

**INDUSTRIES & PRODUCT TYPES SUPPORTED:**

Browzwear is focused on the apparel industry, leveraging our proprietary 3D draping capabilities that are essential for the visualization of soft goods. The company collaborates with 3rd party developers through our open platform to support a variety of other products.

OUTPUT FORMATS & 3D PRINT:

Browzwear output is available in the most frequently used, standard forms such as DXF, OBJ, FBX and VSP.

PLM INTEGRATION & API

Browzwear features a simple, XML/JSON format for data transfer that makes it very easy to populate any PLM system with 3D technical data, BOM and all other information required for producing physical samples. Browzwear 3D is integrated with leading PLM solutions.

WHAT ARE THE APPLICATIONS OF YOUR SOLUTION(S)?

Browzwear provides products for different stages and teams in the garment lifecycle:

Lotta: 3D Fashion Design. A 3D solution created especially for designers, Lotta makes it easy and fun to express your creative vision in an unlimited range of colours, styles, materials, lighting effects and more.

VStitcher: 3D Fashion Development. Transform 2D patterns into realistic 3D prototypes with vStitcher, the industry-leading 3D visualization and development solution for pattern-makers, cutters and technical designers.

Stylezone: 3D Fashion Showcase. View and share 3D designs with Stylezone, a revolutionary collaboration platform for web and mobile that enables all stakeholders to participate at every stage in the process, from design through merchandising.

TechPack: 3D Manufacturing Spec. With the click of a button, generate detailed PLM-ready specifications for manufacturing the 3D garment. Every team member downstream receives exactly the information they need, including materials, trims, workmanship, patterns, prints and more.

WHAT SETS YOUR 3D SOLUTION(S) AND YOUR COMPANY APART FROM ALTERNATIVES OFFERED BY OTHER VENDORS?

Browzwear is the only company that specialises in 3D simulation for the entire garment lifecycle. Browzwear provides Lotta for designers, vStitcher for pattern makers and manufacturers, and Stylezone, a cloud platform for showcasing 3D designs on web and mobile. Our patented products are powered by fabric draping and visualization technology that delivers the most accurate, photo-realistic 3D garment representation available.

Browzwear is adding the third dimension to PLM. The TechPack generator transforms 3D designs into detailed manufacturing specifications at the click of a button. Brands can use them stand-alone, or integrate with any PLM system to enrich their garment lifecycle management.

With an open platform, Browzwear supports 3rd party developers to enable a variety of solutions to work together seamlessly and maximise value for our customers. Together with our partners, we are improving and extending the fashion workflow for sell in/sell through, direct to consumer marketing, garment customisation more.

HOW HAS YOUR CUSTOMER BASE USED YOUR 3D SOLUTION(S) TO ENHANCE OR REPLACE THEIR EXISTING WAYS OF WORKING?

With the power of true-to-life 3D apparel, our customers are transforming the way they work – from design, through fitting, manufacturing and merchandising. Companies like Adidas, Nike, Columbia, VF Corp and more are using Browzwear to create everything from sportswear to jeans, outerwear and fast fashion.

The key to a successful transition to 3D starts with people. Browzwear Lotta unleashes creativity by enabling designers to create an unlimited number of digital samples and share them instantly with Stylezone. Eliminating the wait for physical samples, means more up-to-the-minute styles that consumers want to wear.

All-digital 3D fitting enables our customers to use a rich toolkit of fitting tools and avatars - from parametric bodies and mannequins to scans of models and athletes – to dramatically reduce fitting costs, physical samples, and model sessions.

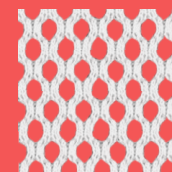
Finally, our customers are merchandising earlier than ever before with beautiful 3D visualizations available long before samples are made.

fashion
is 3D

Zipper puller
id: bwss1610g



Zipper
id: bwssz1608



Mesh
Material id: bwss1635

Browzwear is adding the third dimension to PLM.

Browzwear's complete 3D solution powers the entire fashion workflow from design through marketing. In seconds, you can translate photo-realistic 3D designs into detailed, PLM-ready technical data, BOM and everything you need to produce physical samples.

Learn more at Browzwear.com

NUMBER OF YEARS ACTIVE IN THE RFA INDUSTRY:

Dassault Systèmes has been supply solutions to the retail, footwear and apparel industry for 15 years.

HEADQUARTERS & OTHER ACTIVE OFFICES:

Dassault Systèmes' head office is in Vélizy-Villacoublay, France.



INDUSTRIES & PRODUCT TYPES SUPPORTED:

The industry-centric model deployed at Dassault Systèmes leverages our 12 brands (Technology Promises) to build and propose adapted high-value solutions for each Industry segment and sub-segment. In that context, the Consumer Goods & Retail Industry develops our Industry Solution Experiences and Industry Value Experiences (components) to support the needs of two main segments: Furniture, Home & Garden and Leisure goods as one which could generally be called 'Hard Goods', and Fashion as second. Within Fashion we also adapt the solutions, where needed, to the specificity of each sub segment such as Apparel, Footwear, Leather Goods and Accessories (Watch, Jewellery, Eyewear). Many 3D design elements are shared across all product categories but the primary materials and product structures may drive differentiated requirements.

OUTPUT FORMATS & 3D PRINT:

DS' native format is 3DXML plus import/export (STEP, IGES, COLLADA); focused on preserving the full value of the 3D assets for design & 3D printing.

PLM INTEGRATION & API

API interfaces are available for our PLM solution, My Collection, plus other vendor's solutions. A major principle of our 3D digital strategy is the digital continuity between all elements that comprise an Industry solution and our 3DEXPERIENCE Business Platform organic architecture. PLM is an important element to provide the collaboration and data management, and also the process and workflow management functions.

WHAT ARE THE APPLICATIONS OF YOUR SOLUTION(S)?

Implementation of a 3D digital strategy will bring profound transformation in all the business processes of the Consumer Goods & Retail industry.

Creative Design can visualise and communicate in 3D in a way no flat sketch can convey; even defining products for additive manufacturing impossible to create from traditional means. Product Development can optimise and re-use both aesthetic and technical elements to ensure product 'fit for purpose'. Manufacturing simulation will allow early validation of production constraints. Production could become on demand, localised and personalised. Merchandising can turn design assets into marketing assets going from concept to commerce plus early and parallel design of the selling environments (physical, mobile, web). Consumers can interact with, even customise, designs to enhance purchase motivation and loyalty.

The main challenge is a pragmatic and phased implementation plan of a 3D strategy, taking into account the necessary end-consumer adoption of the more innovative technologies.

WHAT SETS YOUR 3D SOLUTION(S) AND YOUR COMPANY APART FROM ALTERNATIVES OFFERED BY OTHER VENDORS?

Dassault Systèmes' DNA is 3D. Since 1981 we have learned, developed and shared a strong intimacy and deep knowledge of the 3D representation in various industries. We have progressed and helped our customers progress from 3D Design to Digital Mock-up and now to the 3DEXPERIENCE concept. This innovation impulse is powered by both shared and industry-specific R&D teams; while our Brand portfolio is supported by both organic development and a dynamic acquisition strategy. Today we are extending the execution of this 3D digital strategy across our 12 industries.

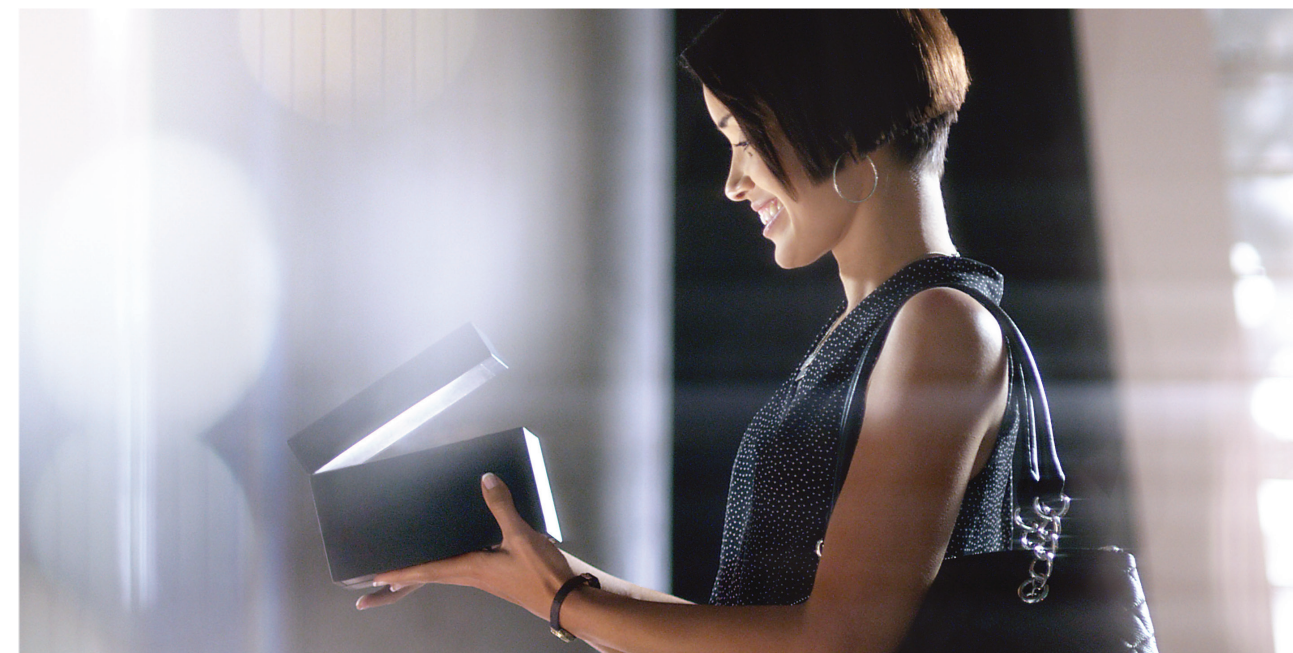
For Consumer Goods and Retail, our objective is to provide leading capabilities in digital continuity for product innovation and experience from creative concept to consumer, accelerating business value while leveraging the emotional power of the superior visual quality of the 3D model.

HOW HAS YOUR CUSTOMER BASE USED YOUR 3D SOLUTION(S) TO ENHANCE OR REPLACE THEIR EXISTING WAYS OF WORKING?

We have been working with select customers in the Fashion segment for the last two years on a disruptive approach based on an overall and coherent 3D digital strategy. Several have implemented portions of their overall strategy, frequently starting with innovative consumer experiences using 3D to transform points of sale into spheres of experience.

Increasingly we are engaging with innovative companies on the next steps in the implementation of their 3D digital strategy. This includes modeling the creation of 3D designs earlier in the process to address global collaboration and communication and brings with it the extended impact on the global business model of the company. This will initially replace current media with new 'tools' but also offers new ways of collaborating and iterating between designers, manufacturers and even consumers.

We expect to see more operational implementations in this area in the next 12 to 18 months.



INNOVATION IN THE AGE OF EXPERIENCE

We live in an age where businesses need to look beyond the aesthetics of a product or the practicalities of a service...where consumer engagement and loyalty count far more than features and benefits alone...where consumers expect to interact with or even influence suppliers – not just be sold to.

Products are no longer enough for today's consumers who value experience over all else.

THE AGE OF EXPERIENCE HAS ARRIVED

Executives and academics everywhere accept that in the modern economy, the key to success is delivering consumer experiences that demonstrate true differentiation.

And yet, the task is a daunting one at best. What exactly is meant by experience? And, more importantly, how can a business influence it, given the complex array of emotional, rational and physical responses that inevitably drive consumer connection?

IF WE CHANGE THE WAY WE INNOVATE, CAN WE DEVELOP EXPERIENCES THAT CONSUMERS DEMAND?

The key to making consumer experience the true focus of innovation is to capture insights and expertise from across a business's entire ecosystem.

Shaping the right consumer experience requires not only the involvement of but also the collaboration between all roles within a company – from marketing and management to sales and engineering.

Only by connecting all the dots between people, ideas and data can a business drive consumer loyalty, engagement and value.

IF WE WANT TO THRIVE IN THE AGE OF EXPERIENCE, WHERE CAN WE TURN?

The 3DEXPERIENCE® platform from Dassault Systèmes is a business experience platform: a new class of collaborative environment specifically designed to help companies create differentiating consumer experiences.

It enables everyone within a company to play an active role in experience development.

With a single, easy-to-use, compass-like interface, the 3DEXPERIENCE platform powers INDUSTRY SOLUTION EXPERIENCES – based on 3D design, analysis, simulation and intelligence software in a collaborative, interactive environment.

The Age of Experience represents a significant opportunity for businesses prepared to place a new focus on creating unique and truly rewarding consumer experiences.

It's time to ask the right questions, understand the present and navigate the future – now made possible with the 3DEXPERIENCE platform.

Discover the 3DEXPERIENCE platform and our INDUSTRY SOLUTION EXPERIENCES at 3DS.COM.

The 3DEXPERIENCE Platform Explained

The 3DEXPERIENCE platform is a business experience platform. It provides software solutions for every organization in your company – from engineering to marketing to sales – that help you, in your value creation process, to create differentiating consumer experiences.

With a single, easy-to-use interface, it powers INDUSTRY SOLUTION EXPERIENCES, based on 3D design, analysis, simulation and intelligence software in a collaborative interactive environment. It is available on premise and in public or private cloud.



It takes a special kind of compass to understand the present and navigate the future.

About Dassault Systèmes Dassault Systèmes, the 3DEXPERIENCE Company, provides business and people with virtual universes to imagine sustainable innovations. Its world-leading solutions transform the way products are designed, produced and supported. Dassault Systèmes' collaborative solutions foster social innovation, expanding possibilities for the virtual world to improve the real world. The group brings value to over 190,000 customers of all sizes, in all industries, in more than 140 countries.

3DEXPERIENCE is a registered trademark of Dassault Systèmes or its subsidiaries in the U.S. and/or other countries.

NUMBER OF YEARS ACTIVE IN THE RFA INDUSTRY:

Gerber Technology has been supplying solutions to the retail, footwear, and apparel industries for nearly 50 years.

HEADQUARTERS & OTHER ACTIVE OFFICES:

Gerber Technology's head office is in Tolland, Connecticut, USA.



INDUSTRIES & PRODUCT TYPES SUPPORTED:

Currently our 3D solution is suited for the apparel industry.

OUTPUT FORMATS & 3D PRINT:

Our 3D solution supports Blender files, .obj, .stl, .html, Yunique PLM, .dae, as well as various other formats.

PLM INTEGRATION & API

API interfaces exist from AccuMark 3D to PLM, and we have an integration as part of our digital solution with YuniquePLM. This allows us to share libraries of data from YuniquePLM to AccuMark 3D.

WHAT ARE THE APPLICATIONS OF YOUR SOLUTION(S)?

Our AccuMark 3D software makes it possible to reduce and even eliminate process steps and interactions among design, sample making and merchandising teams, to help designers optimise their time and speed up important feedback cycles. Virtual sampling will allow apparel companies to reduce time and cost in development and sample making.

Additionally, partners across the supply chain are able to collaborate by sharing designs and virtual samples - enhancing communication when changes are implemented. Gerber's AccuMark® 3D module is an optional module for AccuMark 10.0 and it integrates with YuniquePLM™ allowing greater integration across the entire manufacturing process.

WHAT SETS YOUR 3D SOLUTION(S) AND YOUR COMPANY APART FROM ALTERNATIVES OFFERED BY OTHER VENDORS?

Gerber has taken a unique approach to 3D for apparel visualization. We are using the powerful open source simulation engine Blender for our 3D solution. The technology has been used widely in the animation, movie, video game and simulation industries. Its broad spectrum of modeling, texturing, lighting and simulation capabilities make it one of the most popular Open Source 3D graphics applications in the world

This will allow us to provide unique capabilities to our customers that want to leverage the power of 3D for product development and merchandising.

HOW HAS YOUR CUSTOMER BASE USED YOUR 3D SOLUTION(S) TO ENHANCE OR REPLACE THEIR EXISTING WAYS OF WORKING?

AccuMark 3D was introduced earlier this year, initial feedback from our customer base include excitement around reducing design cycle times and accelerated workflow.

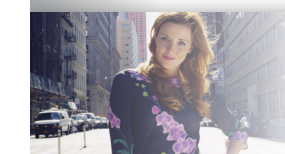
Gerber Technology has been helping companies around the world improve their processes for nearly 50 years, and this continues with AccuMark 3D. We are transforming our customers' design processes by streamlining the steps in creating a garment. The software allows designers to create more styles in less time, meet tighter deadlines and leverage virtual samples to continually improve the creative process.



REACH YOUR
OPTIMUM.

Gerber Technology's AccuMark 3D lets you unleash your creative vision and accelerate your design process. AccuMark 3D saves you time and money by eliminating laborious manual fittings and refittings, as well as expensive remakes.

Take your design to a whole new level with AccuMark 3D.



Learn more in our free "Fast Fashion" white paper
tinyurl.com/gerber-fastfashion

NUMBER OF YEARS ACTIVE IN THE RFA INDUSTRY:
Human Solutions has supplied the Vidya 3D solution since 1985.

HEADQUARTERS & OTHER ACTIVE OFFICES:
Human Solutions' head office is in Kaiserslautern, Germany.



INDUSTRIES & PRODUCT TYPES SUPPORTED:
Our aim is to offer the best and most realistic 3D solution for the needs of the apparel industry – and Vidya has been especially developed to meet those needs.

OUTPUT FORMATS & 3D PRINT:
Vidya has several multi-purpose outputs, from images and 3D geometry to alteration values for made-to-measure and colour-coded pressure maps to determine size & fit and comfort. Major output formats are:

Images: JPG, PNG, TIFF. Size & fit images: colour-coded maps showing stress, strain, body distance and body pressure in weft/warp.

Movies: MOV. 3D objects: garments and/or avatars in OBJ, FBX and MTL.

PLM INTEGRATION & API
Direct acquisition and transfer of data from Vidya to our PLM GoLive solution is possible. There is also an open interface for 3rd-party PLM systems.

WHAT ARE THE APPLICATIONS OF YOUR SOLUTION(S)?

Companies with their own product development benefit from Vidya's virtual prototyping - it's easy to create multiple prototypes and variants. 3D with Vidya also offers completely new ways of working.

PLM and 3D working together have the potential to fundamentally change the entire apparel industry. The combination of virtual fitting, the visualization of garments on a scanned body and the virtual control of sizing & fitting for online shops is a truly evolutionary development that offers boundless opportunities.

WHAT SETS YOUR 3D SOLUTION(S) AND YOUR COMPANY APART FROM ALTERNATIVES OFFERED BY OTHER VENDORS?

Vidya comes with a bunch of USPs such as:

- world's largest database of scanned persons
- direct integration with body scanners
- interactive simulation with avatar animation and interactive draping of garments
- anisotropic material simulation considering different behaviour in weft, warp and bias
- measure fabric properties
- database to administrate materials and assets
- physically based rendering in realtime.

HOW HAS YOUR CUSTOMER BASE USED YOUR 3D SOLUTION(S) TO ENHANCE OR REPLACE THEIR EXISTING WAYS OF WORKING?

Many companies appreciate the value of working in 3D and are just about to start working with it, while many are currently in an evaluation phase. Users who have already opted for 3D are now getting the right prototypes faster, plus they can develop more variants and offer more diversity.

They are sending us very positive feedback, telling us that 3D helps to bring teams together thanks to easier communication and faster response to trends.

Pure Fashion. Pure Fashion in 3D. Vidya – 3D with reality plus

This is how 3D simulation should be – as realistic as possible, integrated into your processes and based on high performing technology. This enables you to achieve striking benefits in terms of prototype reduction, shorter time-to-market and cost saving.

High simulation and visualization quality



3D avatars with realistic dimensions
Interaction of CAD (cut) and 3D (simulation)
Detailed materialWizard and material library

Fast prototyping and approval



Variants in texture, color, cut and size
Pose/animation with natural motion behavior
Integration with PLM and the Cloud

3D collections for marketing and sales



Combination of 3D garments to outfits
Background worlds including light and shade
Free Vidya Viewer

Photo or simulation?

Simulate your collections with photorealistic quality.
See more on www.vidya-software.com

NUMBER OF YEARS ACTIVE IN THE RFA INDUSTRY:
Lectra has supplied solutions to the retail, footwear and apparel industry for 40 years.

HEADQUARTERS & OTHER ACTIVE OFFICES:
Lectra's head office is in Paris, France..



INDUSTRIES & PRODUCT TYPES SUPPORTED:
Our solution is dedicated to the fashion & apparel industry.

OUTPUT FORMATS & 3D PRINT:
Apart from the Modaris 3D native format, 3D prototypes can be outputted in OBJ and FBX standard formats.

To date, we are agnostic and we do not have partnerships with 3D printing houses nor manufacturers.

PLM INTEGRATION & API
Modaris 3D is one of the many business applications of Lectra Fashion PLM and, as such, it is fully integrated in Lectra Fashion PLM. Our PLM is dedicated to fashion and apparel companies. Lectra Fashion PLM covers the entire product lifecycle (including product development and prototyping activities) to help companies control calendars, schedules, resources and costs, as well as handling complex relationships with external suppliers.

WHAT ARE THE APPLICATIONS OF YOUR SOLUTION(S)?

Our 3D prototyping solution is one of the many business applications of Lectra Fashion PLM. Fabric mechanical properties, fabric visual elements (print, knit, weave, colourways), the avatars used for 3D simulation of a garment and the related patterns, measurement charts and 3D prototypes are all stored and shared in our platform.

If a patternmaker submits a 3D prototype for fit and/or style review, a designer, a product developer or a merchandiser will be able to visualise it and to request changes if needed, leading to modifications of the initial pattern, and submission of an updated 3D prototype for review.

Additionally, based on the style review, a textile designer may have to modify the size, position or colourway of a print. Once he has submitted the new print, the patternmaker will be notified and be able to run a new 3D prototype for review.

WHAT SETS YOUR 3D SOLUTION(S) AND YOUR COMPANY APART FROM ALTERNATIVES OFFERED BY OTHER VENDORS?

Modaris 3D is a virtual prototyping solution dedicated to Fashion and Apparel companies. It is totally integrated with our pattern-making & grading solution, allowing to develop virtual prototypes smoothly.

It is fully integrated in Lectra Fashion PLM, demultiplying the collaboration thanks to the 3D representation of any style.

It includes a range of parametric mannequins, Alvanon's standard avatar libraries, and the ability to use bodyscans for total adequacy with the physical mannequin used for fitting sessions. It also includes more than 300 fabrics with their mechanical properties, matched with the latest reference guide "Fabric for Fashion: The Swatch Book", allowing for an easy selection of fabric for each simulation.

Last but not least, our 3D solution is a powerful fitting review & style validation tool to implement a lean product-development process at customer's, for which we provide a dedicated methodology and full support to maximise the benefits of the technology.

HOW HAS YOUR CUSTOMER BASE USED YOUR 3D SOLUTION(S) TO ENHANCE OR REPLACE THEIR EXISTING WAYS OF WORKING?

Customers are using Modaris 3D in different ways according to their specific business model and process.

A UK retailer implemented our 3D solution when they decided to bring patternmaking activities back in-house. Virtual prototyping allowed them to cut the number of physical samples down, reducing time to market to 4 weeks, enabling them to be the first retailer to propose a range of children's wear based on the most recent British children size survey. They could adapt the fit of their products in 3D across the whole size range.

A French leader in children's wear uses Lectra 3D solution as a central vector in its product-development process. It enables designers and patternmakers to communicate in a new way, enhancing their creative process. It provides them with a tremendous advantage in terms of planning and control of upcoming collections, and it has become an essential tool for them to master fit.

RETHINK HOW YOU SEE PRODUCT DEVELOPMENT

Lectra's 3D
virtual prototyping
is giving product
development
a makeover.



NUMBER OF YEARS ACTIVE IN THE RFA INDUSTRY:
Optitex has supplied solutions to the retail, footwear and apparel industry for more than 28 years.

HEADQUARTERS & OTHER ACTIVE OFFICES:
Optitex's head office is in Israel.



INDUSTRIES & PRODUCT TYPES SUPPORTED:
Apparel & additional fashion luxury goods (i.e. bags).

OUTPUT FORMATS & 3D PRINT:
We have our own proprietary file format for outputting 3D data (.clt and .mod); we also support output in common file formats such as .fbx and .obj among many others.

PLM INTEGRATION & API
We developed an SDK that allows our customers to integrate their own PLM with the Optitex application.

We are currently developing an integrated solution with PTC's FlexPLM to allow transparency of both 2D and 3D data into and from our customers' PLM system.

WHAT ARE THE APPLICATIONS OF YOUR SOLUTION(S)?

With Optitex O/Dev 2D and 3D Suites, customers can create and customise 2D patterns and stitch them into a digital 3D garment at the push of a button, to perfect an item of clothing before cutting or sewing the first piece of fabric. This boosts efficiency and productivity across the entire design and development workflow. In addition, we've recently introduced our web-based Digital Collection App that allows internal stakeholders or external buyers to see an entire collection, in all styles and colours, in full 360° 3D, with a zoom function for closer inspection of the fabric.

Our O/Sel Digital PhotoShoot App allows users to photograph a live model in a couple of poses, save the images to a computer, and then drape any 3D design on the model's image. This saves time and money on photo shoot sessions, while creating ready images perfect for use in marketing and merchandising efforts.

WHAT SETS YOUR 3D SOLUTION(S) AND YOUR COMPANY APART FROM ALTERNATIVES OFFERED BY OTHER VENDORS?

Our dedication to our customers can be felt in everything that we do. This includes constant innovation, full lifecycle customer support, and a unique technology that fuels inspiration.

For a smoother, more efficient workflow, we offer a single integrated platform that allows customers to see every change made in 2D or 3D automatically reflected in the other.

To ensure customers' success, we make certain that they get the specific business value they seek from every Optitex solution, every step of the way.

This is backed by our dedication to technological innovation, long reflected in our pioneering software – including the first Windows-based system and first integrated 2D/3D digital product solution – that has helped transform the textile industry.

In addition, our team brings together deep industry knowhow and remarkable creativity, for true thought leadership and real results that help customers improve the way fashion is designed & developed, produced, and sold.

HOW HAS YOUR CUSTOMER BASE USED YOUR 3D SOLUTION(S) TO ENHANCE OR REPLACE THEIR EXISTING WAYS OF WORKING?

More than 8,000 companies worldwide rely on Optitex for a more efficient workflow.

Roberto Cavalli, for example, replaced manual paper-dolls with Optitex's integrated 2D/3D solution, to accelerate the development workflow for its handmade garments. Cavalli is now successful in creating designs quicker and more accurately than before, to support a strict two-month-long development cycle.

Scott Sports' designers experienced difficulty conveying new ideas to decision-makers, who were less able to visualise end-results. Using Optitex 3D made this task much easier and faster, resulting in a more simplified decision-making process, reduced number of prototypes, and accelerated development time.

Under Armour was able to meet an exceptionally tight deadline, creating 250 high-definition prototypes in just three weeks using Optitex's 2D/3D pattern solution. This allowed product line managers to sort and sell the new women's collection in real-time, during a sales meeting. The 3D images were so good they'll be used in company catalogues.

INSPIRE DIGITALLY

Tap into the power of 3D to revolutionize the way you Develop, Produce & Market Fashion.

ODev

Solutions for product development

OPro

Solutions for production

OSel

Solutions for sales, marketing & merchandising

NUMBER OF YEARS ACTIVE IN THE RFA INDUSTRY:

Tukatech has supplied solutions to the retail, footwear and apparel industry for 20 years.

HEADQUARTERS & OTHER ACTIVE OFFICES:

Tukatech's head office is in Los Angeles, California, USA..



INDUSTRIES & PRODUCT TYPES SUPPORTED:

Tukatech's TUKA3D is a 3D virtual prototyping and sample making software system designed specifically for the apparel industry. Just as you have a fit session for a garment in real life, TUKA3D takes digital patterns and turns the pattern pieces into "virtual cloth" that can be sewn in the computer and tested on a 3D fit model.

OUTPUT FORMATS & 3D PRINT:

3D files can be exported as OBJ, FBX, VRML, X3D, or XHTM files. Videos can be rendered and exported as AVI, WMV, or MOV files. Images can be rendered and exported as JPG, TIF, PNG, BMP, and many others.

PLM INTEGRATION & API

We have API interfaces for our 2D and 3D CAD systems and we integrate with many PLM, ERP systems.

We are presently in licensing negotiations with one of the biggest ERP/PLM systems provider for total integration.

WHAT ARE THE APPLICATIONS OF YOUR SOLUTION(S)?

1. Create instant samples - TUKA3D turns patterns into digital samples, with accurate fabric settings. Send samples via e-mail for instant feedback.
2. Decrease approval time – TUKA3D reduces approval time from weeks to days via digital sample.
3. Provide accurate fit - Users provide TUKA3D with pattern, type of fabric and measurements of fit model and system accurately creates sample.
4. Animation – TUKA3D has built in motion simulator to evaluate sample in any pose, with any movement. Thermal settings analyse fit in motion for stretch, warp and weft. X-Ray module analyses garment and body for comfort settings.
5. Test pattern blocks and shapes - TUKA3D can test accuracy of pattern blocks and basic shapes while drafting pattern.
6. Virtual Sales - Display TUKA3D digital samples on websites for virtual sales. No photo-shoot or physical garment required.
7. Offers designers flexibility – Provides a first-look sample as soon as pattern is drafted.

WHAT SETS YOUR 3D SOLUTION(S) AND YOUR COMPANY APART FROM ALTERNATIVES OFFERED BY OTHER VENDORS?

Many of TUKA3D's features, such as offline sewing, draping in stages and high-resolution cloth simulations for gathers and shirring/pleating simply don't exist in competitor systems.

TUKA3D is the only 3D system for apparel with a built in motion simulator, allowing users to evaluate the sample in any pose and with any kind of movement.

HOW HAS YOUR CUSTOMER BASE USED YOUR 3D SOLUTION(S) TO ENHANCE OR REPLACE THEIR EXISTING WAYS OF WORKING?

Yes, many users of TUKA3D have replaced their old ways of working. One of our customers has completely eliminated the physical sample step. They create hundreds of dresses per month and using TUKA3D has proven that the digital sample is equivalent to a physical sample, so the physical sample is no longer required.

Another customer uses TUKA3D to create made-on-demand clothing. They upload 3D samples on their website and only create the clothing once the order is placed. Using TUKA3D allows them to show every angle of the garment so customers know exactly how the final garment will look.

TUKA3D

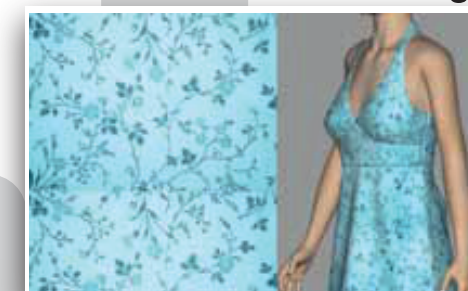
eFit • eDesign • eCommerce

eFit



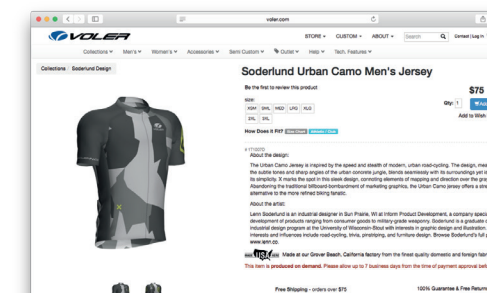
Create realistic garments on the computer from actual patterns. Allowing Designers, Pattern Makers & Buyers to make fit evaluations quickly, in real time.

eDesign



Offering designers freedom to view any style with any fabric & print instantly.

eCommerce



Showcase virtual photo shoot for online sales without manufacturing a single garment.

for more information visit us at: www.tukatech.com
or email us at: tukateam@tukatech.com

Market analysis 2014/15

FOR YEARS THE PLM MARKET FOR RETAIL, FOOTWEAR AND APPAREL HAS BEEN MISUNDERSTOOD BY CUSTOMERS AND MISREPRESENTED BY VENDORS AND ANALYSTS ALIKE. EXCLUSIVE TO THIS PUBLICATION, THE LATEST INSTALMENT IN WHICHPLM'S SERIES OF MARKET ANALYSES BUILDS ON THE FRAMEWORK DEVELOPED AND REFINED IN PREVIOUS PUBLICATIONS, AND AIMS TO SET THE RECORD STRAIGHT.

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. Over the coming pages we have reviewed the RFA PLM market at a global level, analysed the customers involved (segmented by Tiers), and examined the geographical spread of PLM adoption and its effect on the total market size in the fiscal year 2014/15. We have also considered the drivers shaping the future direction of the market, as well as presented the implications of our research in three executive summaries tailored for vendors, consultants and customers.

WhichPLM is grateful to the vendors that contributed their time and effort to provide the requested information, 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 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. Despite the special coverage of 3D working featured elsewhere in the publication, the emphasis of this analysis remains on core PLM solutions, rather than the wider set of extended PLM solutions that range from 2D, CAD/CAM & 3D CAD to supply chain execution.

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 Retail, Footwear and Apparel (RFA) shown here, and our definition of a financial

year are both good examples of why reference to the Glossary section can be helpful in understanding this analysis, and readers should not hesitate to look up any terms that are unfamiliar to them.

WhichPLM takes great care to obtain, catalogue, collate and analyse information from across the RFA PLM market, from our cross industry customer survey and directly from the premier vendors. This process of collecting refreshed information from each of the vendors was made easier through previous years' experience, leading to more accurate sales data and a heightened level of interpretation in these pages. And although our analysis team continues to push back, validate and check for simple mistakes in the information given to us, we are now in a much stronger position when it comes to enforcing criteria with vendors, and are no longer provided with inflated or falsified sales information.

Each of the supporting vendors has shared publicly available PLM sales data from the fiscal year 2014/15, and under non-disclosure agreements they have also each shared the identity of private sales and provided trend insights, so that we could maintain the accuracy of our global market analysis and compare these results to those we obtained in 2013/14. In the same vein, we have maintained our 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 which are harder to secure and contrast, and are often entirely private. 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 do not meet the inclusion criteria set out in our Glossary.

Although WhichPLM is based in the U.K., our online and print publications adopt a truly international perspective, and ours remains a growing, global readership, including vendors, customers and analysts that are distributed worldwide. For ease of comparison and in recognition of this international reach, we have again used the US Dollar (USD) as a common currency.

INTERNATIONAL READERSHIP OF WHICHPLM

WhichPLM readership by region averaged over the period is as follows:

EMEA: 38%

Asia: 18%

Americas: 44%

ANALYSIS CREDENTIALS

The twelve months between the publication of our 2014 Annual Review and this Report have solidified WhichPLM's position in the RFA industry - a uniquely privileged position 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 since 2008.
- WhichPLM has deep industry knowledge and expertise, born out of hands-on experience of design, development, selection and implementation of apparel-specific PLM products.
- WhichPLM has benchmarked many of the market's leading solutions, and has a deep understanding of the functionalities, capabilities and business potential of modern RFA PLM solutions, as well as a clear and documented roadmap for its future.
- WhichPLM team members have worked for and with all the primary vendors, and our publications and services remain entirely unbiased.
- WhichPLM has delivered generations of earlier reports which have been well reviewed and well received, with our Annual Reviews in particular being cited as vital tools in large-scale digital transformation initiatives.

But 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 refined customer survey, helping us to provide an up to date view of the sharp end of the market.

Thanks to this approach 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 the conclusion of the market analysis section in our 2014 Annual Review, our analysis team predicted 20% growth worldwide in RFA PLM deals in 2014/15. In practice, this growth in number of sales was closer to 10% amongst premier PLM vendors: in the 2014/15 period, the adjusted total new sales equalled 171 new customers.

In previous publications (most notably our 2014 Annual Review) we have referred to the achievement by PLM of critical mass, and this perception continues for the fiscal year 2014/15, with PLM still achieving double-digit growth, and reaching broader penetration across the industry.

In the Market Sizing section of this analysis, we have explained the rationale behind this adjustment in this year's market figures, and this detailed explanation is not repeated here.

These figures do not, however, factor in those PLM vendors that have not been included within our vendor listings. In previous years we have estimated this excluded pool as totalling 40 vendors - typically smaller companies that sell PLM very occasionally as an add-on to their core

business solutions - and we believe this figure to remain accurate, accounting for an estimated 100 further sales to be added to the 171 documented in this publication.

Although the exclusion of these vendors does limit market growth, the WhichPLM team remains steadfast in its commitment to analysing only those vendors who meet our inclusion criteria, rather than confusing the market.

Compared to the distribution of sales we saw in our 2014 Annual Review, the top-level international composition of RFA PLM sales in the period 2014/15 was as follows:

REGION	2013/14	2014/15
EMEA	43.5%	36%
Asia	11%	13.5%
Americas	45.5%	50.5%

In comparison to equivalent figures from last year, the Americas and Asia have grown their proportion of the total new name sales, while Europe has slipped back a little.

To place this continued double-digit growth in context, IT industry analyst firm Gartner recently predicted 7.5% growth in Enterprise Application Software for 2015 - a growth rate that is anticipated to continue on average for the following four years. This accords with the evidence for PLM's continued growth that we have presented in recent years, and resonates with our predictions for the coming twelve months - both of which are significantly higher than the global average for other enterprise software.

That being said, growth in 2014/15 fell somewhat short of our predictions - something that is accounted for by a number of factors, including:

- Changes in the mix of PLM sales by Tier size - particularly a shortfall in the lucrative Tier 0.
- Evolution of the list of primary vendors included in the report.
- Performance variations across countries.
- The lengthened timescales involved in modern PLM projects, with sales often being announced later than in previous periods.

Although new name sales in Tier 0 have fallen, it is important for readers to remember that these are large enterprises amongst whom additional roll-outs and phases of the PLM project can account for hundreds (or potentially thousands) of additional licensed users within internal departments and across their network of supply chain partners. This step-by-step progress towards PLM's true potential has been made possible by improvements in the capabilities of partner user licenses, and should also be considered a sign of the continuing maturation of PLM's collaboration capabilities.

Based on this year's feedback from PLM project teams and end users, the ratio of software to services appears to have levelled out at 1:3, which we feel is very reasonable for larger enterprise deployments (Tier 0). For lower sized companies (Tiers 1-3) we have consistently seen ratios closer to 1:1, hence these ratios are assumed to be lower in the market sizing model.

Over the last decade we have seen most PLM solutions increase their processes from an average of 10 (confined primarily to product design and development tech-packs) to the 40+ processes typically found in a modern PLM solution – a full suite that includes trend, storyboarding, merchandising, 2D creative design, deeper supplier collaboration, RFQ, mobile and the start of CSR, 3D, supply-chain visibility and marketing modules, to name just a few of the latest additions.

These extra modules and their integration to the extended E-PLM environment will necessitate additional services, so we do expect to see a possible increase in the services to software ratio over the coming years, drawing more in line with the complexity of ERP implementations as new process introductions become included within the PLM suite.

This will also require additional education on the part of PLM vendors’ own internal and third-party partner resources to better understand the inputs and outputs of the additional modules, and to properly map the touch points between core PLM and E-PLM solutions.

At the same time as this rise in service costs, however, we have seen software license costs stabilise as we predicted in our 2014 publication. But what has changed is the value proposition: PLM solutions today often include modules and capabilities that were not previously regarded as being part of core PLM, or that fell under the umbrella of E-PLM and attracted an additional cost to the customer to implement.

Despite this enhanced value per licensed user, the average price has held reasonably steady at just over \$2000 per user, where we expect it to remain.

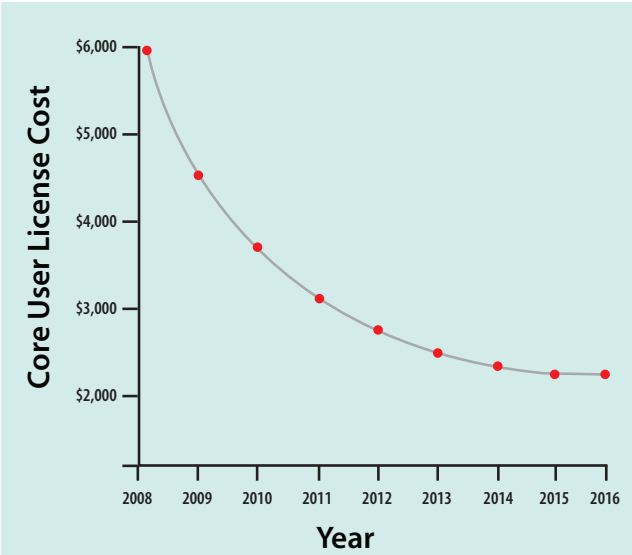
As discussed by our CEO, Mark Harrop, in his editorial feature earlier in this publication, PLM has progressed beyond the “crossing the chasm” status we cited in last year’s market analysis, and continues to enjoy adoption by what Geoffrey A. Moore (the originator of the chasm concept) refers to as “early majority pragmatists”, or those members of the mainstream who have received sufficient education to regard PLM as the sensible solution to both their common and unique challenges.

In accordance with Moore’s model, we believe that there remains significant market potential to be realised before PLM tips over to the “late majority conservatives” and “laggards”.

Tied to Moore’s model is the mandate that a functionally complete solution is required in order for any product (Moore talks particularly about “disruptive” ones) to achieve mass market penetration, and the results of WhichPLM’s ongoing Supplier Evaluations suggests that while improvements to core functionality remain necessary, PLM as an entity now resides at the centre of a comprehensive, extended ecosystem that enables it to deliver compounded benefits to customers.

These conclusions continue to be borne out by our customer surveys, hands-on research, and other evidence collection.

The return on investment potential of RFA PLM is today well-understood by the majority, and reference selling based on reliable, proven experience is now considered essential, as the benefits of PLM – reduced cycle time, better margins, enhanced collaboration – are balanced against the risks inherent in improper research, preparation and partner selection.



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 are often cited by vendors and analysts as helping to lower the ‘barriers to entry’ of PLM.

While WhichPLM does acknowledge that core license costs have decreased substantially within the past decade, it is important for prospective PLM customers to remember that module cost – the price of additional software modules that the average customer is required to purchase in order to have a complete solution – has risen over the same period of time, meaning that the TCO of PLM is almost certainly more static than the market at large expects.

It is critical that customers compare like for like solutions, including all required modules, when analysing their TCO.

PLM SALES BY TIER:

WhichPLM differentiates between PLM customers on the basis of revenue, separating them into what we refer to as “Tiers” according to the rules in the “About our Tiers” box on the opposite page.

There has been a significant reduction in the proportion of sales this year to Tier 0 customers (2%), and also a reduction to Tier 1 customers (9%). The proportions for Tier 2 (12%) and Tier 3 (77%) both increased as the larger volume Tiers (i.e. those that encompass the largest potential pool of customers) increasingly take the largest proportion of the new name deals.

Last year’s report noted that Tier 2 sales had reduced significantly (by 24%), however this year Tier 2 has recovered 7% in the proportion of new deals, suggesting that this sector of the market may be experiencing fluctuations governed by regional trends (covered under the next sub-heading of this section) and the other forces shaping PLM sales.

ABOUT OUR TIERS:

Throughout this section and elsewhere in this year’s publication, we refer to customers as falling into four 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 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 up to \$499 million.

Please note:

We have retained the four Tiers originally set out in 2014 in this year’s report, allowing us to maintain consistent comparisons between financial periods.

It remains clear that Tier 0 sales are significantly larger than the sales within the smaller Tiers, and in reality the value of such major enterprise sales can heavily distort the perception of what the average sale consists of. Our Tier 3 definition has remained constant from last year at customer turnover of up to \$499 million, as this smaller end of the market is continuing to show large numbers of sales, and builds on a larger base of existing customers.

GEOGRAPHIC ADOPTION OF RFA PLM

This short section will analyse the international adoption of PLM in what we believe to be four of the most noteworthy regions. Broadly speaking, primary PLM vendors are heavily focused on their own local markets, and the establishment of offices further afield is typically taken as a strong indicator of market potential in those locations.

This effect is evidenced by the continued dominance of the USA in its proportional share of sales, underpinned by the work of vendors like Centric Software, CGS, Gerber Technology, Infor, PTC, NGC and TradeStone. Similarly strong in their home markets are Visual 2000 (Canada); Dassault Systèmes and Lectra (France); TXT Retail (Italy); Koppermann and Human Solutions (Germany); and WFX (India).

This is not to say that these vendors are focused solely on their local customers, and indeed a number of these have begun to work elsewhere to considerable success. The following regional analysis looks at some of the forces that are shaping this international expansion.

Asia

Across Asia it is clear that new, emerging brands, retailers and manufacturers are looking to follow the efficiency gains made by Western counterparts following their adoption of PLM. This need for greater optimisation in the product lifecycle is being partially driven by rising labour rates, which are having an increasingly significant cost impact in countries such as China.

Indeed, Chinese companies are now experiencing the same market pressures as their peers in long-established markets, being forced to shift manufacturing operations offshore. And as Western brands have proven for decades, this model of chasing reduced labour costs brings with it challenges in the areas of communication and collaboration – problems that we expect these growing brands and retailers to adopt PLM to overcome.

Another key driver for PLM adoption in Cambodia, Vietnam, and Myanmar as well as in other up-and-coming sourcing countries is the need for customers in the Americas and Europe to use PLM to help collaborate with their manufacturing partners across the Asian regions. This drive to tap into lower-cost labour rates by expanding beyond the usual sourcing locations is not entirely new, but is coming increasingly into focus as cost pressures change the viability of certain established sourcing countries. For more on this please refer to the section titled “Domestic and International Manufacturing” underneath the “Future Regional Potential” heading of this market analysis.

Across Asia, the steady growth in proportion of PLM sales (particularly in India, where emerging omni-channel retailers and brands are spearheading adoption) supports the hypothesis that it is the maturing of larger retailers and manufacturers becoming their own brands that is driving adoption.

Latin America

Within the global spread of the growing PLM market, one area of particular activity – albeit one that has not been a focus point previously – is Latin America. This market analysis has identified two key trends that are believed to signal the start of a shift in the global market for PLM solutions:

- A growing number of Latin American brands that have adopted or continue to investigate the potential use of PLM to help drive innovation in their fashion business.
- The gradual introduction of skilled local resources by a number of established vendors (who previously were dependent upon flying in experts from North America or Europe) and the establishment of new vendor offices within the region to meet the needs of local customers.

A strong example of this trend is Brazil – a country that is experiencing economic difficulties, and where domestic retailers, brands and manufacturers have been forced to begin looking at ways to improve end-to-end efficiencies, reduce cost and increase profit margins. We expect that these organisations will follow the same pattern seen elsewhere in the world by implementing PLM solutions.

In addition to Brazil, there is also increasing evidence of new PLM implementations in countries such as Argentina and Columbia which validates this renewed focus.

Overall, WhichPLM sees significant growth in interest in PLM solutions across Latin America. And given the gradual establishment of new offices by a number of primary PLM vendors, WhichPLM anticipates significant further growth in this region in the coming years, and we expect to hear customer success stories that equal – or even exceed – the scope of equivalents in North America and Europe.

United Kingdom

During the financial year 2013/14, a single, large-scale fashion PLM sale created a dramatic splash in the UK market. Following on from this, our analysis team expected the scale and scope of the project to stimulate a round of smaller deals as competing retailers responded by adopting PLM programmes of their own. As yet, this trend has not materialised, although the United Kingdom has seen a consistent level in the number of publicly identified PLM contracts.

This seeming shortfall in sales is believed to have been driven more by a question of the timing and phasing of projects, rather than a lack of potential demand in the country. This is validated by the increasing number of inquiries being received by WhichPLM from UK based companies looking to understand more about PLM and the benefits that its adoption can bring.

Italy

Italy has long thought of itself as the home of luxury fashion, and the country operates at this level much like a brand – investing in local craftsmanship and manufacturing, and making associated investments

in PLM and E-PLM technologies to help keep pace with innovation and respond to market pressures for cost and efficiency.

The drop in the percentage of new deals seen in Italy year on year is therefore attributed to a remarkably strong performance in the period 2013/14, and hence a natural easing off during the 2014/15 period. WhichPLM is confident that the percentage of new sales coming from Italy in future years will increase, driven by a notable resurgence in customer interest and ongoing discussions between our advisory team and a number of prestigious luxury brands in the country.

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 2014/15, 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.
- 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.

Item	Tier 0 (3 sales)	Tier 1 (16 sales)	Tier 2 (21 sales)	Tier 3 (131 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)
Total seats this year:	28,000 (comprised of 10,500 internal, and 17,500 external)	11,400 (comprised of 3,800 internal, and 7,600 external)	2,400 (comprised of 800 internal and 1,600 external)	8,475 (comprised of 5,650 internal, and 2,825 external)
Typical per user license cost:	\$1,000 internal, \$500 external	\$2,500 internal, \$500 external	\$2,250 internal, \$500 external	\$2,000 internal, \$500 external
Total license costs this year:	\$4.1 million	\$11.2 million	\$6.8 million	\$14.7 million
First year maintenance (as a percentage of software license costs):	18%	20%	17%	15%
Total maintenance this year:	\$0.7 million	\$2.2 million	\$1.2 million	\$2.2 million
Typical number of service days to conduct implementation:	2,000 man days	600 man days	300 man days	100 man days
Total service days this year:	6,000	9,600	6,300	13,100
Typical service costs per day:	\$1,750 per day	\$1,500 per day	\$1,250 per day	\$1,000 per day
Total service costs this year:	\$10.5 million	\$14.4 million	\$7.9 million	\$13.1 million

The effects of these adjustments are not significant, and remain consistent with the evidence visible in international and Tier-based adoptions.

The table on the left-hand page 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 therefore the market as a whole.

The left-hand table itself adheres to the following rules:

- Per user license costs are based on an equivalent, traditional licensing model, and do not take account of subscription /cloud deployments.
- Service days include 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.

The below “Total RFA PLM Market Size” calculation table is based upon the same assumptions as used in our 2014 Annual Review, taking account of the typical numbers of users, internal to external user ratios, percentage maintenance costs, and the service implementation days required across each of our Tiers.

These figures reveal a total size for new name sales in the RFA PLM market in 2014/2015 of \$89 million. Compared to the same calculations in the last financial year, the total value of the market has fallen from \$136.8 million – a shortfall caused primarily by fewer Tier 0 sales (3 this year and 14 last year), where the highest licence cost, maintenance cost, service cost and a number of other indicators are typically exhibited.

TOTAL RFA PLM MARKET SIZE FOR 2014/15

Cost	Tier 0	Tier 1	Tier 2	Tier 3	Total
License costs	\$4.1 million	\$11.2 million	\$6.8 million	\$14.7 million	\$47.9 million
Maintenance costs	\$0.7 million	\$2.2 million	\$1.2 million	\$2.2 million	\$6.3 million
Service costs	\$10.5 million	\$14.4 million	\$7.9 million	\$13.1 million	\$45.9 million
Composite Total	\$15.3 million	\$27.8 million	\$15.9 million	\$30 million	\$89 million

Although the numbers of sales in the market as a whole have increased, therefore, the total dollar market value has reduced, and the average value of each PLM sale has decreased as a result.

It is worth reiterating, though, that previous years’ sales to Tier 0 organisations will continue to generate additional revenue (potentially multiple millions of dollars) in further implementation milestones and supply chain roll-outs, leading to increases in true market value.



































Readers should remember, though, that there are two main factors where this purely monetary size calculation does not necessarily provide the complete picture:

- There remains the aforementioned potential for over 100 further PLM sales from the assorted PLM vendors that fell outside our definition of primary PLM vendors and are therefore not covered by this research and analysis. If these were incorporated within the calculation matrix, then the total could be adjusted upwards by as much as a further \$46.7 million.
- The internal resource cost to deliver the PLM implementations, hardware and rollout, during this year equate to approximately \$178 million of additional cost, which is not reflected within this total market calculation.

Overleaf, we now move to look at how this market sizing – along with geographical distribution, customer tiers, and a number of other facets of the RFA PLM market – may change in the future.

“PLM has progressed beyond the “crossing the chasm” status we cited in last year’s market analysis, and continues to enjoy adoption by what Geoffrey A. Moore (the originator of the chasm concept) refers to as “early majority pragmatists”, or those members of the mainstream who have received sufficient education to regard PLM as the sensible solution to both their common and unique challenges.”

SHARE OF TOTAL RFA PLM SALES BY COUNTRY (%)

Country	2013 percentages	2014 percentages	2015 percentages
 Argentina	0.0	0.0	1.0
 Australia	11.0	1.5	0.5
 Austria	0.5	1.5	0.0
 Belgium	1.0	0.5	1.0
 Brazil	1.0	0.5	0.0
 Canada	2.0	5.0	5.0
 China	1.0	4.0	4.0
 Colombia	0.0	0.0	2.5
 Denmark	1.0	0.5	0.0
 Finland	0.0	0.0	0.5
 France	6.0	6.5	6.0
 Germany	8.0	2.5	6.0
 Greece	0.0	2.5	0.0
 HongKong	1.0	0.5	1.0
 India	2.0	2.5	6.0
 Israel	1.0	0.0	0.5
 Italy	6.0	12.0	5.0
 Japan	2.0	1.5	1.0
 Lebanon	0.0	0.5	0.0
 Luxembourg	0.0	0.0	0.5
 Mexico	0.0	0.5	4.0
 Netherlands	4.5	2.0	1.0
 Norway	0.0	3.0	0.5
 Romania	0.0	1.5	0.0
 Russia	0.0	0.0	0.5
 South Africa	0.0	0.0	2.0
 South Korea	0.5	0.5	1.0
 Spain	2.0	2.0	2.0
 Sweden	0.0	1.5	0.0
 Switzerland	2.0	0.5	0.0
 Taiwan	0.5	0.5	0.0
 Turkey	2.0	0.5	4.5
 UK	13.0	6.0	6.0
 USA	32.0	39.5	38.0

REGIONAL POTENTIAL

The RFA PLM industry has long been dominated by a small number of major sales territories, and this illustration (showing the percentage of total RFA PLM sales in the periods 2012/13, 2013/14, and 2014/15) demonstrates how this has remained consistent through the periods that we have analysed.

These primary sales regions are joined – influenced by both PLM’s penetration of the mass market and a number of geographical variations examined elsewhere in this analysis – by a growing list of smaller countries that together make up a long tail.

In 2014/15, the largest country by sales percentage remains the USA. Sales to USA-based companies accounted for close to 40% of all RFA PLM sales this year, and although this percentage is reduced slightly from the equivalent we saw in 2013/14, this can be at least partially attributed to the introduction of at least four new countries where new name PLM sales have been recorded this year.

The market is then focused around nine further countries with lesser but still significant uptake of PLM. These include the UK, India, Germany, France, Italy, Canada, Turkey, Mexico and China. The remainder of the market is then accounted for by twenty-three other countries whose share of new name sales have been smaller or more sporadic over the periods we have analysed.

Contrasting this year’s geographical distribution against those seen in previous years, noticeable swings in the relative percentages include:

- Italy: where 2013/14 was a remarkably strong year, but 2014/15 has reverted back to a level similar to that seen in 2012/13.
- Netherlands, Japan, Romania, Greece, Sweden, Norway and Austria: where the percentages dipped relative to previous years.
- Colombia, Mexico, Turkey, Germany & India: where the percentages have shown noticeable growth.
- UK: which, like last year, is still down from the figure noted in our first market analysis that followed this format. We remind readers, however, that this is anticipated to recover again in 2015/16.

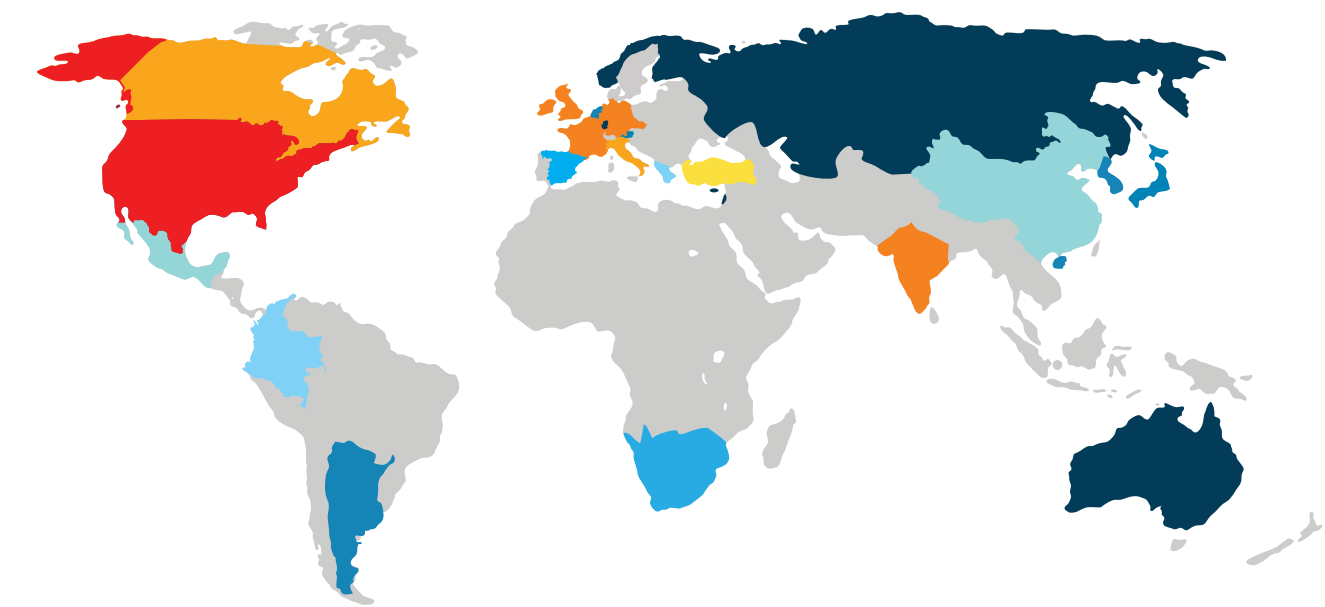
It should be noted that with the countries in the long tail, with only a handful of new name sales each year, there is no great statistical significance to the variations year by year.

Domestic and International Manufacturing

An August 2014 study by Boston Consulting Group on Global Manufacturing Cost-Competitiveness highlighted the considerable changes in average wages, productivity, energy costs, currency exchange rates, and a number of other indices that vary by country. This report identified significant trends including:

- Erosion of competitiveness in Brazil, China, Poland and Russia.
- Increasing costs in high cost countries such as Australia, Belgium and France.
- Steady cost competitiveness in India, Indonesia, The Netherlands and the UK.
- Improvement of cost competitiveness in Mexico and the USA.

HEATMAP REPRESENTATION OF THE SHARE OF TOTAL RFA PLM SALES BY COUNTRY (%)



United States	38%
France	6%
Germany	6%
India	6%
United Kingdom	6%
Canada	5%
Italy	5%

Turkey	4.5%
China	4%
Mexico	4%
Colombia	2.5%
South Africa	2%
Spain	2%
Argentina	1%

Belgium	1%
Hong Kong	1%
Japan	1%
Netherlands	1%
South Korea	1%
Australia	0.5%
Finland	0.5%

Israel	0.5%
Luxembourg	0.5%
Norway	0.5%
Russia	0.5%

Shifts in where apparel, footwear and accessories are made have direct relevance to changes in the global adoption pattern of PLM, since sourcing forms a major part of the product lifecycle – particularly in what has become an increasingly complex, pre-cost calculation environment. Both of these key capabilities – costing and sourcing – are addressed by most, if not all, of the solutions provided by major PLM vendors.

Bangladesh, for example, remains one of the world’s top sourcing destinations for apparel, and we expect to see PLM solutions entering the extended supply-chain here, to support continued improvements within the end-to-end manufacturing process. We are yet to record the first PLM sales directly into Bangladesh, but supply chain partners who use existing PLM systems already cover this and similar sourcing countries.

As highlighted in our 2014 Annual Review, multiple recent research publications by McKinsey & Company have highlighted the partial shift of sourcing operations from China to Bangladesh and to other countries such as Vietnam, Indonesia and Cambodia. This growing shift away from manufacturing dominance by China, analysts suggest, is being driven by increased sophistication of the industry, cost increases (especially salaries) and infrastructure issues. Trade agreements, capacity, supplier capabilities, and relationships with suppliers are also key factors in the development opportunities in countries like Bangladesh that are poised to take over as primary sourcing destinations.

Another long term potential sourcing location is Sub-Saharan Africa, which, while currently only representing a small proportion of the industry’s total manufacturing capacity, is another region with potential for growth.

Currently, the global luxury market sources from its own domestic supplier base and Eastern Europe, and we expect that as the luxury sector

achieves greater growth, its focus on technology to improve quality, efficiency and productivity will have an effect on PLM adoption in each of these regions.

Although driven by different sectors of the international market for fashion, we expect to see greater uptake of PLM to support domestic and international growth in India – currently the third-largest sourcing destination in the world for apparel. Notably, India is also home to multi-billion dollar investments in e-commerce to cater to a rapidly growing domestic market, indicating that enterprise software will soon be required to safeguard the viability of those initiatives.

It stands to reason also that Sri-Lanka – home to large manufacturing groups that cater to many of the global super brands – will also see growth in PLM adoption for both foreign and home-grown needs, with these suppliers adopting PLM to collaborate on design and product development.

Proximity Sourcing

While much of the global production of apparel is offshore in the traditional sense (separated by continents from the headquarters where design and development take place), the effects of proximity sourcing will increasingly be felt in the RFA PLM market. As brands and retailers already know, shortened lead times are a primary driver for the adoption of PLM and E-PLM technologies, and these advantages can be accentuated by shifting sourcing operations to geographic neighbours like North Africa (for Europe) or Mexico (for the United States).

This type of sourcing is also designed to meet environmental and ethical standards, making sustainable, moral sourcing a stronger possibility through closer monitoring, reduced shipping and a number of other optimised methods.

LONG TERM MARKET FORCES

Outside of E-PLM integration, the single largest technological force shaping the future of PLM remains “the cloud”. Recent Gartner research identified that over half of enterprise licensing comes from what that firm refers to as “alternate consumption models”, or what WhichPLM has previously referred to as software-as-a-service (SaaS), but this also includes managed services or other off-site, subscription based models of adoption.

Broadly speaking, we consider the cloud to refer to a paradigm shift in the way software is deployed – one that mirrors the transformation taking place in consumer-grade tools and creative technologies.

While the level of cloud adoption of PLM is currently relatively low, WhichPLM believes that most of the primary PLM vendors have already begun to experiment with (or even release) cloud-deployment models. In our 2014 Annual Review we wrote about how the growth of cloud technologies will help to reduce costly, bespoke customisation on-site, and provide a more flexible platform for the delivery of standardised configurations. The technical architecture to deliver these cloud solutions varies, but WhichPLM is starting to see the development of multi-tenancy based systems. This shift in technological foundations will be linked to a need for new PLM customers to adjust their expectations and approach to software licensing. As the subscription model becomes the norm – a trend already seen in fashion as Adobe’s Creative Suite (including the industry standard Illustrator tool) switches over – Opex budgets will need to expand, as Capex budgets contract.

This will have an impact felt outside of the customers’ offices, too, as vendors who adopt the subscription model see changes in the level of recognised revenue and, potentially, the value of their own organisations. Demand may also become more unpredictable or fluctuate, as seasonal resources need to become licensed users for a period of time – during a heavy workload – only to then become inactive, non-paying users once their short term engagement has ended. This represents a change in mindset for an industry accustomed to long-term or permanent user licenses.

Some vendors have already invested in the migration of their traditional solutions onto a cloud based model, while others are still in progress. Beyond core PLM, we should remind readers, some solutions may never be entirely suitable for cloud deployment – particularly those with uncompromising standards of latency, or where heavy computation lifting is required.

Although not driven by cloud technologies exclusively, the increased flexibility and adaptability of modern PLM has already begun to prompt some users – many who have used their early PLM solution for more than a decade – to begin considering a potential replacement for their legacy solution. In some cases, though, these mature solutions have been customised to such an extent that the customer is simply unable to migrate to the latest generally available versions of their product.

This is leading to increased migration costs when software upgrades are adopted, and increased costs for ongoing maintenance. Some customers have found that their earlier customisations have been superseded by the steady enhancement of core product solutions, and may even face a major re-implementation if they were to move to the latest supported version.

This will, we predict, have a direct causative effect on the rate of entirely new solutions (and vendor partners) being chosen in place of the upgrades that incumbent vendors assumed were the logical choice. Indeed, the results of this year’s customer survey reveal that this level of replacement is not an uncommon consideration for customers whose legacy solution represents something of a dead-end on the upgrade path.

As predicted in our 2014 Annual Review, the gradual migration from legacy PDM solutions to more modern PLM solutions (often those with the “out of the box” label) will continue to grow as a driver of the volume end of the PLM market. Outdated PDM solutions will not be maintained forever, and customers still depending upon legacy PDM products should already be questioning their solution vendor on their roadmap for continued support.

Despite good tech-pack functionality, PDM has been functionally and commercially replaced by the much more capable PLM, and the attraction of simplified, cloud-based migration to a new pre-configured PLM solution will only serve to accelerate the rate at which these legacy platforms are made obsolete. This may lead to further changes in the set of primary PLM vendors over coming years.

Reflecting our assessment of PLM as the backbone of modern design and product development, we are also seeing an increased need for integration between different PLM solutions and the rapidly expanding E-PLM operational ecosystem as a key differentiator in customers’ shortlisting and selection processes. Rather than adopt the traditional point-to-point links approach, a growing number of vendors have already invested in a Web Services strategy, and are working to provide an “enterprise hub” style platform that can provide integration and interoperability across many systems.

MARKET PREDICTIONS

Although our growth predictions for this fiscal year were tempered somewhat in reality, our analysis team remains optimistic in predicting that a total of 200 new name PLM sales will be achieved worldwide in the year 2015/16, confined to the premier RFA PLM vendors covered in this report.

This represents a further growth of the industry of 17% year on year, supported by the considerable number of prospect enquiries our advisory team receives on a regular basis – something that has historically proven to be a strong indicator for future growth. Our ongoing relationships with key PLM vendors have also revealed plans for further expansion of vendor offices into both Asia and Latin America, which will have a positive educational effect on those local markets in the years ahead.

Our overall market growth prediction is built up from expectation that the sales to Tier 0 size businesses will remain consistent, Tier 1 will grow by 25%, Tier2 by 32% and Tier 3 by 14%. These growths by Tier level are anticipated because of the continued growth in interest from medium sized business, and the lack of growth in sales to the very largest businesses. The level of penetration of PLM solutions at the large scale – to those super-retailers and brands who make up Tier 0 - is already significantly higher than the mid to small size sales, which still represent a major potential market for PLM.

This prediction also reflects the increased emphasis placed on rapid “time to value” projects, or those implementations that can be considered relatively light in comparison to the volume of customisation required for legacy projects. Readers should note, though, that these growth predictions also exclude those vendors (such as ERP and E-PLM vendors who only sell minimal numbers of PLM licenses) who fall outside our inclusion criteria; between them, these vendors can be expected to sell another 120 PLM solutions in the period 2015/16.

Similarly, the measure of new name sales does not reflect the aforementioned significant roll-outs of new licenses to existing customers. While our analysis team believes that new name sales remains the most efficient and informative method of analysing the RFA PLM market, its 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, the growth predictions indicated in this analysis are made at a particular point in time (this publication being released in the autumn of 2015) 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 have this year 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

Vendors reviewing the market analysis will be interested to see the progress being made geographically by other primary vendors in exploring new territories. For example, the addition of countries in Latin America in the latest customer analysis might also be a key indicator for continued and emerging demand from new potential customers in this region, such as in Colombia, Mexico and Argentina.

The vendor profiles themselves show that some vendors are expanding the scope of their solutions to address wider business processes, and as a result, vendors might wish to review their own roadmap and strategic direction to consider whether changes should be adopted. For example, some vendors have invested in more comprehensive planning capabilities, in 3D visualisation and in additional mobile applications – all of which strengthen the extended-PLM ecosystem potential of their product. As the core PLM functionality is broadly similar across the primary RFA PLM vendors – barring the variances seen in WhichPLM’s Supplier Evaluations - it is these broader capabilities that are starting to help differentiate one solution from another. This increased scope in end to end solutions will, however, require an increased focus on educating resources in the associated broader business processes, as well as the wider technology solution set.

Given this publication’s special focus on 3D, and the following “Future of PLM” section which examines the recent popularity of the “Internet of Things” concept, vendors should prepare for a further evolution not just in PLM’s popularity, but in its scope and role within a modern apparel business.

The few vendors who opted out of inclusion in this year’s report will hopefully see from this enhanced market analysis framework and our earlier vendor profiles that they have not helped to reinforce their own position, and have only served to add a layer of confusion between customers and their true character and capabilities. WhichPLM strongly encourages such vendors to ensure they contribute fully to next year’s report.

EXECUTIVE SUMMARY FOR PLM CUSTOMERS

The international growth of PLM should largely be considered as a positive for prospective customers, since a PLM project is always best undertaken by an experienced team of local professionals who understand the challenges and opportunities specific to a particular market. Wherever they are located, however, prospective customers should take steps to ensure that the vendor resources who will be conducting their implementation (not just those who

fly in for the demonstration) have sufficient business process expertise, as well as the technical capabilities to deliver the project efficiently.

Integration of PLM with other software applications is today key to realising the potential business benefits available from a true process-led approach. The days of creating and maintaining an extensive set of point to point integrations are no longer the recommended approach. Customers should ensure that their chosen vendor’s approach to integration emphasises maximum re-usability.

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.

As the results of this year’s customer survey and those contained in our previous Annual Reviews attest, the impact of selecting the wrong PLM vendor or conducting an ineffective implementation can be catastrophic. WhichPLM continues to see evidence of PLM solutions being put in place that are not suited for the customer, or that were not managed in a way that led to user adoption. In these cases, costly customisation or even a complete replacement of the solution is not unheard of.

EXECUTIVE SUMMARY FOR PLM CONSULTANTS

Implementation consultants reviewing this market analysis should pay particular attention to the geographic developments and emerging trends outlined in our executive summary for vendors, since the same considerations apply to resourcing in these emerging markets. Similarly, the ongoing success of PLM on an international level indicates that vendors will increasingly 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 meet unpredictable demand.

We also apply the same caution to those vendors who are absent from this publication here as we do in our executive summary for PLM customers, since these 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.

Finally, both this year’s market analysis and customer survey results underline a need for cross-industry management consultancy firms to develop or acquire specialised resources in order to change the common perception that their services are unsuited to the requirements of the RFA industry. In a market where a small number of dedicated advisory practices currently handle the bulk of PLM preparation, selection and implementation projects, consultants are advised to either up-skill existing staff, or to consider partnership agreements with independent, experienced professionals who are familiar with apparel-specific processes and the extended-PLM landscape.

The Future of PLM

Look into the future of any industry, and one trend will loom larger than any other: connectivity.

WITH THE UBIQUITY OF HIGH-SPEED INTERNET ACCESS (BROADBAND OR FIBRE OPTIC CONNECTIONS ARE NOW THOUGHT OF AS A UTILITY, THE EQUAL OF WATER OR GAS) HAS COME THE PROGRESSIVE GROWTH IN THE DIFFERENT KINDS OF HARDWARE AND SOFTWARE THAT CAN BE CONNECTED TO IT AND, BY EXTENSION, TO EACH OTHER.

Our mobile devices, our watches, our central heating systems, our refrigerators, our televisions, our lights and security systems, our automobiles, our medical and fitness trackers – all have addresses on the same global network, a layer of interconnectivity interwoven in virtually every aspect of modern living.

The consumer implications of this are obvious and far-reaching, and the world's largest brands are already running with the baton, experimenting with what's possible in a world where everything can theoretically talk to everything else, and we're never more than a bar of 4G (or LTE, in the USA) reception away from a vast sea of information.

In fact, this is so significant a shift that analysts and entrepreneurs have scabbled to coin a name for it ever since the size and cost of embedded systems reached a tipping point of possibility. You may have heard some of these names; you'll certainly have heard the most prominent one: the "Internet of Things", or "IoT".

Coined by Kevin Ashton, a technology pioneer who helped found the global standard for radio frequency identification sensors, the IoT refers to precisely the kind of world that is coming to pass – one where the existing internet infrastructure is joined to the physical environment through sensors and systems embedded in tangible products, both smart and dumb.

It is also a term that's been borrowed fairly loosely and liberally, recently gaining traction in the retail, footwear and apparel industry, where some technology vendors are beginning to incorporate the acronym into their messaging – postulating ways in which the IoT will affect the products we make, the ways we make them, and the consumers who wear them.

WhichPLM has long maintained that PLM belongs at the heart of the modern product lifecycle. In our publications and advisory engagements, our team – particularly Founder & CEO, Mark Harrop – has spent the last fifteen years evangelising the idea of PLM as the central repository for all product design and development information, and as a way of consolidating and connecting the growing number of hardware and software solutions that make up what WhichPLM terms E-PLM – the extended enterprise technology environment of a typical brand, retailer or manufacturer.

So we certainly share a common vision with those who talk about fashion and the Internet of Things, but rather than jump wholeheartedly into the fray, we take a more cautious approach to the reality. The purpose of this article is not to define exactly what the Internet of Things might mean for fashion – that is something to which we intend to devote our 6th Edition publication to – but rather to set out what we believe should be the industry's approach to the broader concept of connectivity, and explain why, in many ways, this is a new face on an age-old problem.

To help understand why connectivity to this degree represents the future of PLM, it's important that we outline recent developments in core and E-PLM functionality, as well as digging a little deeper into some of the other factors that have contributed to the growing RFA interest in IoT.

Of primary importance is the realisation that the IoT isn't a product or even necessarily a conscious end goal, but rather a way of referring to how an eventual outcome might be managed. Connectivity is being added to consumer and enterprise hardware and software simply because it can, or because it serves a more immediate need – not necessarily because it serves a grand design of standardised global data exchange. Embedded systems and sensors are both small and cheap to add to existing products, or to design new products around, and the phrase machine-to-machine (M2M) has been in circulation for some time as a way of labelling the connectivity they enable.

Coupled with the global migration to IPv6 (the revision of the internet protocol that opened up a gigantic range of IP address spaces) these technological advances create the ability for a large array of "things" to be connected to one another and to monitoring or interpreting systems, but it does not pre-suppose anything beyond that point. How industries respond to that ability for things to connect is up to them, and the real, meaningful discussion around IoT for the RFA industry begins there.

Secondly, the term "smart" has become co-opted to mean "connected", when in fact the two are not synonymous. A smart thermostat or a smart watch is indeed a clever product in the sense that it both collects and interprets data, achieving the level of automation that people tend to think

"The world's largest brands are already running with the baton, experimenting with what's possible in a world where everything can theoretically talk to everything else"

of as the outward face of connected devices. But analysts estimate that between 8 and 75 billion objects (a fairly significant margin of error) will be connected to the internet by 2020, and it's fair to say that a significant number of these will not qualify as smart: lacking as they will local processing capabilities. To put this in context, a plausible middle ground (predicted by the IDC) puts the number of connected objects at 50 billion by the turn of the next decade, suggesting that the current ratio of 3.47 objects or devices per person in the world will rise – even taking account of population growth – to 6.58 objects by the same date. And while these devices will technically be nodes in the global network, generating meaning from the data they propagate will be no small task; the majority of these nodes will primarily be sensors, providing real-time, "dumb" data feeds of everything from weather or steps taken in a day, to engine maintenance needs.

Meaning is something we place a great deal of emphasis on, because as with any big data project – and this has the potential to the biggest of all – it will be necessary to define structures and systems within which raw data can be processed in order to contextualise it and realise its relevance to product design and development.

The first internet-connected "thing" (i.e. something not considered a fully-fledged computer) is widely agreed to have been a soft drink vending machine at Carnegie Mellon University, where small sensors on the racks of plastic bottles and a serial interface were repurposed to allow caffeine-starved programming students to remotely determine the machine's inventory.

More than just a history lesson, this story serves as an acute example of both how ingenuity can emerge from the least likely necessities, and how human intervention is still required to create the foundations that give ubiquitous data meaning.

The critical part of the example, then, came when the vending machine's data was transmitted over what was at the time ARPANET (a precursor to the modern TCP/IP internet). On their own, the packets of data sent by the machine meant nothing. In order for them to be considered useful, a server-side script had to be written to interpret the binary on / off signals from the bottle sensors, returning a yes / no (or soda / empty) value to the user.

And it's here that the real IoT discussion begins: the vending machine was not originally designed to make any determinations beyond dispensing a drink from a chosen slot when the right coins were inserted. But equipped with that limited instruction set, programmers were able to apply a layer of reasoning and interpretation to it, using that soda / empty flag to track how long a bottle had been inside the machine, and consequently whether it had been refrigerated long enough to be considered cold.

In the case of this vending machine, simply being hooked up to the internet wasn't enough to deliver value, because there was – and remains – an important distinction to be made between being connected and being understood.



“Of primary importance is the realisation that the IoT isn’t a product or even necessarily a conscious end goal, but rather a way of referring to how an eventual outcome might be managed.”

The crux of gaining value from ubiquitous connectivity in any industry, particularly one as focused on newness and invention as fashion – will be to build that layer of understanding, a strategy shaped by human needs, business objectives and a host of other variables that will determine how a connected solution or product feeds into a wider intelligence ecosystem.

Speaking about fashion, of course, the manufacturing hardware we’re discussing is orders of magnitude more complex than a vending machine; numerically controlled cutting machines, spreaders, plotters, knitting machines, and laser leather cutters are all complex and extremely capable pieces of machinery with equally detailed (and often proprietary) data inputs and outputs.

The same can be said of the RFA industry’s software as a whole. Although vendors have worked diligently to prioritise intuitive interfaces and polish the user experience, the range and diversity of modules and processes in a typical, modern PLM platform is large – and their inputs and outputs similarly convoluted and, again, often proprietary.

So, in a theoretical world not too distant from our own, where everything is connected and everything talks – in either its own secret language, in a lingua franca, or as simple binary statements – how does the industry determine what is and is not useful data? Because once a family of devices becomes connected, there will be no going back; no manufacturer will buy an offline cutter when the previous generation had been connected to his or her monitoring systems for automation purposes and preventative, proactive maintenance.

And if the manufacturers and users of product development hardware have a difficult, irreversible choice to make, then their counterparts making software – and their customers – are faced with an even less enviable task: the job of creating and then configuring and manipulating the systems that will receive and interpret these reams of incoming data and transform them into actionable intelligence.

For the typical brand or retailer (unworried as they are about the maintenance of the hardware cutting their chosen fabric) it’s here that the conversation should rightly stray from one about connected “things” to one about connected systems – software talking in a common language about a pre-defined set of data that matters.

By now most readers will realise that, for all the buzzwords, we are still talking about integration and interoperability: the software industry’s long-term bugbears, and issues that, WhichPLM feels, should be addressed in the RFA industry before potentially hundreds of new points of data are added to the equation.

Enterprise-wide integration has been proposed as the solution to disconnected systems ever since software tools were introduced to the retail, footwear and apparel industry. Working at a technology incubator in the late 1980s, our CEO was personally involved in the introduction of vector-based drawing tools to RFA businesses, and later in the sale of some of the first PDM and PLM systems – all of which required businesses to consider the thorny questions of where data lived and how it should be shared.

In the beginning, data interchange was handled manually: technical garment specifications and their related files were “pushed” to partners via fax and, eventually, email. When the infrastructure and the software

were adapted to enable it, supplier portals were put into the solutions to allow partners to “pull” that data, without the human intervention.

Although the volume of technology solutions in use within a typical Tier 0 brand or retailer has ballooned to 100 or more in the intervening decades, little progress has actually been made towards standardised integration. Most recently, the push – pull relationship has shifted somewhat, and truly modern PLM implementations allow for dynamic, automated data sharing across the extended supply chain through centrally held master information and tightly integrated page links. But nevertheless, internal, system-to-system connectivity is still something conducted on a case-by-case basis in most instances.

Where integration projects have taken place, they have until recently been limited to a link between PLM and ERP at a relatively high level. Basic product master details have usually been the sole currency exchanged between the two enterprise systems, and only a few implementations progressed further, taking in the interchange of bill of materials, bill of labour, supplier information, costing data, exchange rate tables and so on.

With the growing recognition of extended-PLM has come a recent move to what’s referred to as a “digital transformation” mindset, whereby the full suite of solutions that play a role in the product lifecycle (design, development, planning, marketing, analysis, distribution, sales and more) are considered for integration, with PLM serving as the backbone or enterprise hub. Prominent examples of progress in this area include PLM developers’ addition of bi-directional interfaces to the fashion industry’s drawing tool of choice, Adobe Illustrator, their own 2D and 3D CAD products, and to planning tools and colour management standards.

Although not all of a typical brand or retailer’s 100-strong solution collection should be considered for integration (improved processes and common platforms such as PLM are usually capable of replacing tens of these) connectivity to the key elements of the extended-PLM ecosystem, including hardware, are actually long overdue – particularly when we consider how long these solutions have existed. Cutting and knitting machines are not new concepts; neither are patternmaking systems or planning tools. Indeed, in the former case, hardware from particularly forward-thinking vendors has been both “smart” and “connected” for years.

The technologies exist. The potential to connect them exists (or is being added rapidly). So why are these web-based and internet-enabled “things” not typically talking to one another?

Sadly it remains a question of commercial viability. On the table since the late 1980s, standardised integration has been a long time coming – often on the tips of salespeople’s tongues, but never quite materialising except as bespoke, chargeable work. This is where the reality of enterprise I.T. differs from the public promise of the IoT: the internet is built upon standards governed and enforced by a supra-national body, while the vast majority of PLM and extended-PLM solutions use proprietary methods of communication. This is something that WhichPLM believes will need to change if new pieces of the puzzle are to find their places and add value to an interconnected environment.

By way of an example, a new material entered into and approved within the master PLM library could have its properties (drape, weight, and other behavioural characteristics) automatically added to an integrated 3D CAD

solution, allowing a designer to quickly generate virtual prototypes using the new fabric. This example relies on two things that, at the time of this publication, cannot be assumed: a standardised format for material information, and seamless integration between the PLM and 3D systems. This is why each 3D vendor who appears in our listings was asked to provide details of their solution’s inputs, outputs and existing points of integration.

Another example that shares the same disconnect between promise and the underlying reality would be in sampling, where the manual rejection of a sample could theoretically trigger automatic notifications to instruct all of the connected solutions involved in making a revised sample – patterns, materials, trims, components – to take action. Realising this demands the same levels of standardisation and integration as our previous example.

This level of connectivity and automation is, WhichPLM agrees, emblematic of the future of PLM, and our hope is that the IoT trend can spark a renewed discussion about the need for integration. Over time, this has the potential to bring smarter processing and a more personalised, informed kind of intelligence to the product lifecycle, including:

- Real-time continuous monitoring and business intelligence.
- Predictive modelling.
- Security-based access to information.
- Predictive, perhaps even automated, decision-making.

With the right approach, an IoT-inspired mindset also has the potential to completely revolutionise a brand’s relationship with its supply chain partners, fostering transparency to a degree far beyond that we see in CSR modules and guidelines today. WhichPLM has written previously about Radical Transparency (a model whereby costs, mark-ups and logistics are visible to the end consumer) but even this is based on more traditional methods of monitoring, whereas true connectivity could enable a brand to analyse the data generated by smart cutting machines a continent away, tracking the exact status of their order within a supplier’s facilities.

“Simply being hooked up to the internet wasn’t enough to deliver value, because there was – and remains – an important distinction to be made between being connected and being understood.”

This of course has its own set of implications – things that perhaps even IoT evangelists are unprepared for. So, on behalf of the brands, retailers, manufacturers and technology vendors, WhichPLM intends to spend the next twelve months taking an active role in these discussions, attempting to get at the truth of how global connectivity – whatever name is finally assigned to it – will affect the future of the product lifecycle, and therefore of PLM itself.

Because if one thing is clear at this stage, it’s that value won’t be found in connectivity alone – it has to be earned. When PDM was first introduced, for example, it was met with scepticism; the idea of all product data residing

in one place was considered extreme. And in practice (although PDM proved wildly successful at the time) the true extent of that early vision was not realised until two generations later, with modern PLM, by early adopters willing to take a chance on a dream.

We believe that the same cycle may apply to the IoT, with the mainstream waiting for the value to become evident, and for others to take the initial plunge. And if decades’ worth of experience in the PLM market has taught us one thing above all else, it’s that there is no one-size-fits-all solution, even to common problems. The value in PLM became apparent when it reached a state of configurability and baseline functionality that allowed it to be quickly and non-destructively adapted to the needs of a particular organisation. And it appears now as though the IoT will earn its stripes the same way, through experienced professionals architecting solutions that leverage connectivity in the right places.

To exploit the value of this connectivity, there will be a growing need for large scale data management and embedded analytics, intelligently applied to turn the real-time flow of data into a tool for actionable decision-making.

Just as this publication has done for 3D, readers can expect the WhichPLM Report: 6th Edition to address the subject of connectivity in detail, and to present the same level of insight - geared as our initiatives always have been to enabling the retail, footwear and apparel industry to make informed choices about its future. ■

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 FEATURE CONTRIBUTORS. WHILE WE HAVE MADE EVERY ATTEMPT TO DEFINE THESE WHERE THEY FIRST OCCUR, THE NATURE OF 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 PHRASES, THIS GLOSSARY COLLECTS CONCRETE DEFINITIONS FROM APPAREL TECHNOLOGY EXPERTS OF WHAT WE CONSIDER TO BE THE MOST USEFUL, CONTESTED AND POPULAR PLM INDUSTRY TERMS, ARRANGED IN ALPHABETICAL ORDER.

2014/15

Each WhichPLM publication represents a retrospective look at the financial year that has gone before it, this Report included. Our 2014 Annual Review, released late that year, examined trends, market analysis, topics, events, end user feedback and more – all originating from or pertaining to the fiscal year 2013/14, while the publication you hold in your hands contains the same content, but from the financial year 2014/15. 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 “2014/15” in these pages, we mean the period from 1st April 2014 to 31st March 2015 rather than both full calendar years.

3D AND 3D WORKING

This publication is labelled “the 3D issue”, and many of its editorial features and discrete portions of analysis place a significant emphasis on the RFA industry’s transition – already begun - from two-dimensional working to a three-dimensional equivalent. This transition can take many forms, from the introduction of 3D CAD tools (distinct from their 2D equivalents) into design rooms, to the use of offline 3D rendering to populate product catalogues. There is likely to be no single, agreed-upon point by which a fashion organisation could be said to have completed this transition, but broadly speaking we consider 3D working for RFA to be characterised by the creation and use of high fidelity, three-dimensional assets at one or more stages of the product lifecycle. Our introductory spread and our editorial features collect a wide range of perspectives on the use of 3D in RFA.

3D PRINTING

A cottage industry in and of itself, 3D printing refers to the process by which three-dimensional design files – typically from a 3D CAD solution – are made into physical products, either in their entirety or piece-by-piece. This process can be conducted in multiple ways, from traditional “additive manufacturing” (whereby a material is added, layer by layer, to create a single whole shape) to more experimental techniques such as polymer spraying or the use of electrical fields to guide materials into shape. At the time of this publication, 3D printing of garments is still at the experimental stage, but many of the images of finished footwear, eyewear, headwear and accessories that appear in these pages were achieved through 3D printing techniques. Our editorial features cover the implications of these techniques in greater detail.

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.

CPM

A short transitional phase between PDM and PLM (between 2000 and 2003), standing for Collaborative Product Management. These solutions bolted additional collaborative functionality onto the capabilities of PDM, but fell short of what we now consider to be true PLM.

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.

GA

General Availability (or GA) is used to refer to the most up-to-date version of a PLM solution (or indeed any software) that is currently available to a paying customer, and that is fully maintained. Prospective customers of PLM should not buy a solution on the basis of functionality or modules that are not listed as being in the GA release – unless their own due diligence has identified commitments that it will be added to the GA release in a satisfactory timeframe.

HUB AND SPOKE

Analogous to a hub at the centre of a bicycle wheel and the spokes that radiate from it, we use these terms to refer to PLM deployments that begin at the headquarters level (the “hub”) and then expand to the various “spokes” that make up the local and international supply chain.

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

An old term, today repurposed as a way of labelling an interconnected, internet-enabled future of devices, products, machinery, white goods and essentially anything that might feasibly be made “smart” in any way, as well as the management and use of the resulting “big data”. IoT is too broad a concept for this publication – with its 3D and core PLM focus – to cover in detail, although our closing piece, The Future of PLM, provides a more detailed look at what IoT is likely to mean for the RFA industry.

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, Consultant and 3D 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 2014/15, 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.

NPI / NPD

Used interchangeably with each other, the acronyms NPI and NPD may stand for one of two things: New Product Introduction (or Development), or New Process Introduction (or Development). In the case of products, NPI or NPD is defined as the entire cycle of product creation, from ideation to market. Where business processes are concerned, NPI or NPD will instead refer to the adoption of new processes by a business, and their transition from informal to fully documented.

OOTB

This acronym stands for “Out of the Box”, and refers to a pattern whereby vendors apply the OOTB label to their solutions, claiming that they offer a robust product development environment as-is, with little or no 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 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 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 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 a 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. The expenditure involved in licensing, implementing, and maintaining a modern solution remains significant and 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.

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.

Thanks & attributions

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