PLM BUYER'S GUIDE 2021

whichPLM

WELCOME TO THE
PLM BUYER'S GUIDE 2021

We're now into the eleventh year since we produced our first annual report – and for those of you that have followed us from the very start, you will no doubt remember that the series was renamed to the Buyer's Guide back in 2018. If you happen to be a new reader of WhichPLM, then we hope that you will find the topics within this Buyer's Guide of great interest and of great value to yourself, your business, and your partners operating across the end-to-end value-chain.

The team at WhichPLM were involved in the earliest introductions of digital technologies in Fashion, dating back to the introduction of the first personal computers coming to our sector in the late 1970s. It all started with the introduction of the Commodore Pet, which was the first PC to find its way onto the factory floor, helping machinists to improve their sewing performances, visualising their hourly production achievements. (Today, we would probably relate this to gamifying information.) The next phase of PCs came from IBM with the rollout of the PC XTs that were used in the early '80s to support CAD (pattern design, engineering & marker making), Creative Design (illustrations, print design, texture mapping, room-sets), CAM (NC cutting, numerically controlled cut path optimisation), and of course the forerunner to PLM: PDM (product data management).

In recent years WhichPLM has been recognised as the independent fashion and retail PLM authority, based upon these very roots. Today, WhichPLM continues to be a trusted partner to many of the world's leading fashion retailers, brands, sourcing agents and manufacturers. We spend our time constantly researching new technologies, evaluating PLM software, testing new processes with vendors, sharing thought leadership, writing, and analysing technology across the entire end-to-end fashion value-chain.

Unlike the vast majority of fashion magazines that monetise the bulk of their editorial content, WhichPLM continues to stand by its founding mission to provide educational articles, insights, use cases, vendor press releases, supplier listings, and exclusive data rich deep-dive Buyer's Guides (like this one) completely free of charge for our growing community. It's always humbling when we hear from lecturers and their students, and senior executives all over the world just how much they value WhichPLM's contribution to the story of Fashion's digital history and future. And perhaps more importantly for our readers, is how this story relates to the real world, how new technologies can be used within the apparel industry; our articles are often supported by detailed, proven and tested use-cases.

It's genuinely exciting for myself and the team to continue to see our reports and earlier Buyer's Guides, dating back to 2010, still being downloaded, read, and shared by thousands of people on a regular basis. In that time, our publications have reached junior, middle & senior executives and stakeholders from the vast majority of the world's largest tech-savvy retailers, brands, educational establishments, global consultancies, business analysts, best-of-breed solution vendors, venture capitalists and more.

Due to this continued accomplishment and the increasing growth of new technologies coming into the apparel industry, as some of you will already know, we decided in March 2020 to launch our latest brand; The Interline, focusing on everything digital *but* PLM – researching and covering some 25 different technology categories that are adding to the fashion and retail technology solution ecosystems. I'm pleased to report that The Interline has gone beyond our wildest expectations and succeeded where other fashion magazines have not been able to achieve the depth of technical, use case coverage we have. Coverage that is

not only interesting for anyone wishing to keep abreast of technical developments, but at the same time is supporting C-level teams into moving from our articles to strategic transformations based upon solution excellence.

WhichPLM continues to stay focused on PLM, going deeper into every module, and supported by use case optimisations, best-practices, and much more – with the aim to support new and existing prospects to not only make sense of PLM, but at the same time to help our readers to make the right scientific choices when it comes to choosing and implementing a PLM solution.

In fact, as in previous years WhichPLM has been working very hard behind the scenes. We have been developing and bringing to market a new digital advisory / PLM project pack, that includes eleven in-depth documents designed to help anyone on their PLM journey – whether it be prospects or current users of PLM - by following our best-in-class approach and methodologies. This pack supports businesses from the early stages of evaluating PLM, through to recommendations on how you should go about implementing a PLM solution. This is truly the most detailed toolkit available in our sector, having utilised WhichPLM's vast expanse of industry knowledge, and honed it into 11 easy-to-digest documents.

WhichPLM will go right to the heart of PLM in 2021 and as always, we will look at what's coming over the horizon. Within the new project pack you will find a new PLM maturity assessment tool, complete with an updated, 2021 list of modules, sub-processes, and extended best-of-breed technology questions that we recommend you should be asking vendors when making a PLM selection or upgrade to your existing PLM implementation. We will report on the changing architectures and the latest technology trends that can

be integrated as part of a broader PLM solution ecosystem. This will include new modules, process upgrades, and much more – all of which are rapidly changing as modern PLM platforms continue their journey to cater to the widest possible range of brand and retail collaborations.

Continuing our growth over the last decade, I'm confident that the 2021 PLM Buyer's Guide will reach an even wider global audience than ever, and with the addition of The Interline publication, I believe this gives our readership two priceless platforms to help you and your business stay in tune with the growing pace of new technologies coming to the fashion industry.

My team and I are incredibly lucky to work as advisors with many of the world's leading retailers and brands, and their amazing likeminded people, that continue to experiment, evaluate and implement some of the most advanced technologies the world has to offer. Every year these new vendors increase in their numbers, they excite with their amazing capabilities that can be delivered far faster than ever before. We have been very busy researching, understanding new use cases, testing technology theories, evaluating software, and creating awareness for the many technology newcomers. If you are one of these new companies that came to WhichPLM & The Interline over the last twelve months, thank you. If you have a new, exciting technology that you feel is going to change Fashion processing for the better, then we would love to hear from you; please feel free to reach out to our Editors at WhichPLM & The Interline.

Technology has been something of a dual-edged sword for the fashion industry: it has delivered clear benefits, but also played its part in creating many of the world's problems when linked to CSR (Corporate Social Responsibility) and Sustainability. I have written on this

topic in previous Buyer's Guides, and in my opinion, our industry is still behind the curve when it comes to the matter of sustainability and the effects that products have on the environment. It's time for retailers, and brands - together with PLM vendors - to up their game to help reverse the negative impact of fashion products. We need to collectively move beyond talking and start the process of doing when it comes to the subject of sustainability and the effects that our choices have on the wider environment. We reported last year that the retail, footwear, and apparel industry continued to come under the firing line for its poor environmental practices and records – and with the continued levels of public criticism retailers and brands urgently need to heed the warning signs and take real, measurable actions, before change is forced upon them!

I stand by what I said last year: I believe, more than ever before, that the technologies we've created and helped to bring to market over the last few decades actually have the potential to solve the problems of sustainability caused by lower cost production that came about by the deployment of new technologies (the likes of 2D & 3D, CAD-CAM, PLM, Costing, Digital Printing & Dyeing, Factory Planning etc). Because it's only with a thorough understanding of the practicalities and costs – monetary, environmental, and ethical – of their complete product lifecycles that brands and retailers can start to take meaningful steps towards making this urgent change.

We've all seen the continued increase in the use of 3D, but if we are honest with ourselves, I feel that the driver wasn't only a matter of sustainability, but rather to combat the difficulty of getting access to physical samples, due to the many challenges brought about by the effects of the pandemic. Our industry, vendors and customers of PLM & other solutions need to do far more when it comes to delivering on sustainability and the environment. More recently, we have seen the introduction of digital printing and dyeing that can print on pretty much every material type, resulting in not only increased speed, but a massively reduced carbon footprint and delivering an environmentally friendly process, dyeing only what's needed rather than having to purchase yarn/threads with minimum quantities that go to waste.

We really need to rethink what goes into our products, we need to educate our designers on the choices that they make and the effects that those choices within the bill of materials (BOM) have on the environment; we also need to look beyond design to how we manufacture our products, the time it takes, the quantities that we order, and we need to be mindful of who is making our product and ensure that they are being given a fair living wage. Sustainability is one of the areas that requires urgent attention; year by year, we continue to hear of the concerns coming from consumers, NGOs and governments, and yet we see little real action. It's now beyond time, and like I've said before, it's not just fast fashion that caused the environmental problems, but all fashion and CPG (consumer packaged goods) sectors, who all shared the same trend of using new technology and offshoring to reduce cost and at the same time turning their products into commodities to a greater or lesser degree.

We are starting to see new, exciting collaborations between retailers, brands and their value-chain partners. Businesses continue to come under pressure to improve collaborations, and its not only the pandemic that is driving this change, it's been evolving for many years - even decades. We started to collaborate with PDM and automatic faxing, we then moved onto email, followed by vendor portals with PDF PLM-Tech-Packs, and more recently value-chain partners have started to use PLM licenses shared via retailers and brands.

Businesses are starting to accelerate supply chain collaborations to better align production with demand trends. Yes, the pandemic has prompted businesses to fast forward these initiatives that would otherwise have taken several more years. And it's not just to the tier 1 manufacturers, but beyond to tier 2 fabric suppliers, tier 3 mills, tier 4 yarn producers, and tier 5 fibre producers. It's no longer just production flow data that is important, but also information flowing between each tier that will add value to the chain.

The extended technology ecosystem is ready to enhance current methods of communication. We've all experienced the shift from a world of total physical touch-and-feel samples and components to a new world of digital product creation that mirrors the physical world. And I'm certainly not suggesting that we shouldn't use physical samples or meet face-to-face; what I'm suggesting is that we must compensate for the lack of physical and on-site interactions with new collaboration methods, and at the same time continue to extend the virtual.

Today retailers, brands and their value-chains have an opportunity to use technology to build stronger collaborations around the topics of improved quality, near-time transparency, on-demand, sustainability, and fair labour.

I hope that you find this year's PLM Buyer's Guide of great interest and value and I welcome you to read our opening editorials, our latest vendor research, and the PLM trends to expect in 2021 and beyond. And I invite you to visit The Interline to learn more on the new and up and coming technologies that are helping to support fashion's lifecycle.

Mark Harrop

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HOW A.I. IS SUPPORTING DESIGN & MANUFACTURING

We've written a lot about Artificial Intelligence (AI) and Machine Learning (ML) over the last couple of years, as it's moved from an 'in the future' position to one of the single biggest revolutionary technologies to come to the market. In fact, we set the scene in last year's (2020) Buyer's Guide in our piece entitled 'What's Next for PLM: 2020 & Beyond'.

Now, it's time to ramp up the use of AI & ML across fashion's value-chain.

My career in fashion technology has spanned four decades, and during much of this time fashion businesses have been handling their operations and business analysis manually, combing over spreadsheets for days on end, analysing recent sales at the beginning of each week - resulting in increased labour costs and endless piles of paperwork, or at best entered onto spreadsheets, all the while delivering sub-optimal results. The modern era of AI is already making dramatic changes when it comes to time and efficiency. Today we can expect fashion companies to analyse sales daily rather than weekly, with some of the fastest performers looking to analyse live sales data, seeing results within a matter of hours. All of which is being powered by the introduction of Artificial Intelligence tools.

The ever-expanding definition

It's almost impossible to read a technology-related article without reading some mention of AI and/or Machine Learning. But, what exactly is AI? Well, in it's most basic definition, AI is intelligence demonstrated by machines, rather than by humans. It's when a digital system is able to perform tasks that would usually require human intelligence. And it's really a catch-all umbrella term for many different aspects of technology: the IoT, augmented reality, machine or 'deep' learning, robotics, business intelligence, delivered by algorithms and programming. If we think about the human intelligence it may be replicating (or replacing) we're talking about things like visual perception, decision-making, or speech recognition – with an obvious example here being smart home devices. AI can mean different things to different people and will be different, again, depending on the use case or context that it is being discussed in.

And the definition(s) are expanding every day, to encompass new (and not-so-new) technologies. The expanding definitions include the likes of: augmented transition networks, automated reasoning, cognitive modelling, decision problems, expert systems, heuristic search, machine learning, means/ends analysis, natural language, understanding, production rule systems, resolutions, robotics, semantics, speech understanding, theorem proving – with more being added by the day. If we take a second to think about the sheer scope of an AI definition, it's no wonder AI is becoming one of the greatest technology revolutions of our time.

What can we use AI for?

So, in our industry, how might we start (or in many cases, continue) using AI as part of the broader fashion technology stack? Well, there are actually a multitude of

that far on our AI journey. Ultimately, AI is about making sense of the sea of data (yes, no longer is data in a lake, it's more like an ocean) and to make sense of it the data needs to be structured, cleansed and tagged (described and labelled) in the form of concise descriptions, text, searches, filters, dates, seasons, and lists of all data types including eCommerce, PLM/PIM/DAM libraries, product image types, shapes, parts that can all be tagged, videos, speech, sounds, and in fact any data that is used inside or outside the business.

The data can also be unstructured in today's world of 'big data'. Unstructured data is the most abundant; it sits inside and outside of your business linked to your value-chain partners. It's so prolific because unstructured data could be anything: media, imaging, audio, sensor data coming from IoT devices located in hardware and software solutions, text data, and much more. Unstructured simply means that it is datasets (typically large collections of files) that aren't stored in a structured database format. Unstructured data has an internal structure, but it's not predefined through data models. It might be human generated, or machine generated in a textual or a non-textual format, and it may come from the web via web scrapes that will allow sales and marketing teams to skim the websites of their competitors, using AI/ML and natural language processing to search, extract and identify competitive information coming from unstructured web pages.

AI is already heavily used in eCommerce, to make intelligent product recommendations, helping customers to visualise products. Cobots (collaborative robots) are collaborating with humans – acting as your AI assistants in the office - helping teams with their daily to do list (TDL) tasks. Cobots are now used in different fields, like supporting shoppers with product queries or providing styling suggestions based upon the shopper's history and profile details. Intelligent machine learning algorithms can analyse the latest sale trends together with your product offerings, sales channels, customers

and buying behaviour to identify the best channels, time and price to list your products, with the goal of selling at full margin, rather than going down the traditional route of discounting. This can save hours or even days of pouring over sales spreadsheets, analysing the data and report writing. AI will help retailers and brands to accelerate sales and work on those products that will deliver maximum margins and profits for the business.

Your personal assistant

AI is already using data to make sense of what's happening in the world and in business. As mentioned above, in the future you will think of AI as your personal assistant that will help you to compile your daily workload. Let's say, for example, you have to design several tops that should be based upon last season's best sellers. In this case, you would ask your AI assistant to go and find you the best performing tops from the previous season (last week, month, or quarter) and then ask your 'assistant' to automatically look for similar product visuals, even going down to breaking each image into precise visual style attributes, materials, colours that can then go onto suggesting similar products from your own style listing or even coming from your competitors' websites - ultimately ensuring that your customers are getting exactly what they're looking for.

Another example might be to use AI to search for materials that fall to within +/- 5% of the original cost or composition and that also offer the best sustainability scoring. Then perhaps you could ask AI to create 20 new colourway options in the background while you start to create new styling details based upon the previous style attributes. You might even ask AI to look at the latest competition offering calling out the silhouette or styling, previous returns analysis, or positive and negative comments coming from social media.

Assistants exist to do just that: assist. Cortana, Microsoft's intelligence assistant, has already been asked 18 billion questions since launch.

Over time your AI assistant will learn yours or your company's likes and dislikes; it will start to recognise patterns of behaviour, it will be able to perform web-based searches based upon the context provided by the users, or deep in your solutions and the computer being used to enter the query. Ultimately it comes down to the exactness of the results based upon how valuable they are to your organisation and the individual users. Over time, AI will be continually tweaked and tested to improve its accuracy and knowledge of all the data types that it learns to recognise, and even teach itself. Algorithms are already supporting buyers and merchandisers, and it won't be long before these roles will trust AI to analyse the previous season's results, recommending latest buy plans, with all the complexities that you can imagine are currently undertaken by seasoned, experienced professionals, but now in a fraction of the time taken by people.

Like many industries the fashion industry is already starting to benefit from AI, in the form of predictive algorithms that in some cases are already in use and others will follow that will be able to predict the next order levels, size ranges, collection of styles, product mix, silhouette options, material types, colour options, cost scenarios, sampling, cut-order plans, material batching (shades and widths) leading to automatic marker making, a range of manufacturing planning options, and sustainability scores - to name just some of the potential opportunities.

And it doesn't stop at the factory. AI & machine learning technologies can be used to improve logistics by optimising shipment methods (sea, air, road), container planning, mixed shipments, and routes, helping to reduce inclusive shipping costs.

options – too many, in fact, to cover here in the level of detail that would be required from any businesses in RFA (Retail, Footwear & Apparel) that are considering AI as an end-to-end business platform ecosystem. So, we'll hone in on a few examples.

Firstly, let's take the data itself. Even if we have an AI engine, unless we have a consistent flow of cleansed data to fuel that engine, then we will not be able to get

So, what are some of the critical tasks of using AI, that will help the fashion sector to streamline the end-to-end workflow?

Knowing your customers (KYC) today

Obviously critical is the speed and accuracy of interpreting consumer behaviours. Humans can't possibly compute the options and accuracy that can be delivered by AI assistants. As we have already stated, retailers and brands are going to need to mine vast amounts of rich data in 'near' real-time, analyse patterns and insights which will feed ML algorithms to help support merchandising, buying and design decision making, development, manufacturing and logistics. AI, together with ML, is already playing a crucial role in helping retailers deliver stellar customer experiences across different fashion channels.

AI enables retailers and brands to understand day-to-day, or even minute-by-minute, changes in consumer behaviour linked to every interaction with a given business. It empowers the first movers of AI to filter through hundreds of parameters such as our likes & dislikes, our favourites, past buying patterns, gender type, location, interests, sizing data, returns data, and spending power etc., and then uses the resulting data-insights to provide suitable product recommendations to each customer.

Ultimately the goal is to predict a consumer's behaviour and create a positive experience that leads to new sales based upon current demand patterns, and of course being faster and sustainable at the same time. To be able to accomplish these tasks, a prerequisite will be the use of large amounts of data. In a nutshell, today's smartest retail AI implementations are plainly, prediction machines that use algorithms (a process or set of rules to be followed in calculations or other problem-solving operations, by a computer) to analyse large datasets, in order to optimise the goal of selling fashion and as they

perform the optimisations, buyers and merchandisers will continually learn and tweak the algorithms to improve their accuracy (hit rates) and recommendations.

The best thing about AI algorithms is that they are designed by humans that are continuously learning from the evolving patterns and insights.

Where does PLM come into it?

So, how might we benefit from using AI integrated with PLM and other best-of-breed design & development and manufacturing solutions? There are, again, too many potential options for this within fashion to include here, so we will share a few potential examples. As we have already written, we can use the sales demand inputs coming from AI to support trend and design, but we can also use AI to help sourcing of production and to balance the manufacturing throughput of our joint value-chain partners, using the same AI algorithms to not only accurately predict trends and designs, but to plan detailed production throughputs. This would be using a combination of future sales demand curves calculated within the merchandise planning solution, pushing results to designers in the form of the assortment, at the same time allowing sourcing and development to share future material requirements with manufacturers to get ahead with acquiring the bill of materials, developing samples, material and product testing, machinery set-up, capacity planning (machines and human resources), monitoring work-in-progress (WIP), quality assurance testing and real-time reporting.

AI is not only helping buyers, merchandisers and designers, but going forward AI has the potential to revolutionise how developers using PLM will be able to search for image assets, products, colourways, patterned materials, accessories, and even the automation of PLM product templates that are manually developed today.

Another exciting use-case is around AI search and compare capabilities, which will enable a user to request a search for similar products that match the tagged images, main product types, material specialty, certified use, target country, sizing details, and so on. From this point, we can expect PLM to automatically build a basic specification (template style) that offers the nearest match to the designer's request, including the base data and process elements, circumventing the need for each person to enter or replicate the entire dataset. Put simply, it's automating the manual process of using template styles, but at a fraction of the time currently taken by PLM users, by automating the administration processing.

AI can further support PLM by searching the database to find and compare products or materials that are similar to their visual counterparts. This process will enable PLM users to move beyond text-only searches to the use of visual search, providing substantial efficiency benefits for all those concerned.

We will be able to use AI-based algorithms to provide valuable knowledge that guarantees stability in development across our value-chains, improving transparency, operating together with IoT (connected devices), factory planning & monitoring, all the while lowering costs and reducing margin risk for everyone involved.

It goes without saying that manufacturers will need to up their game and deploy new technologies (the likes of PLM, Factory Planning, Synthetic Costing, IoT & AI-powered transparency platforms). These transformational upgrades will help to support predictive analytics, smooth out manufacturing maintenance and downtimes, improve efficiency and product quality linked to near-real time rework and returns analysis.

As both the downstream retailers and upstream manufacturers start to deploy AI into fashion's workflow processes, there will be a need to educate employees at all levels across the value-chain on how to read, question, understand, and interconnect with the resulting data.

Integrating with extended technology ecosystems

Using AI within PLM, we will spend less time building and sending Tech-Packs, and more time focusing on making accurate, data-informed decisions.

AI & PLM cannot stand alone; they must integrate with other supporting technology solutions. We have already covered eCommerce and trend solutions, but other examples will include material platforms, scanning systems, CAD/CAM, 3D, Digital Print and Dyeing, Inspection systems and many more.

One of the latest examples of the use of AI is within scanning of footwear and apparel coming out of the SO REAL company, who are using X-ray, CT scanners to scan a shoe or other product and then using AI & ML to clean up the digital noise, recognise the parts that make up the shoe, break each part into it's elements (e.g. Vamp, Vamp lining, Quarter, Collar, Collar lining, or Tongue) - even down to the components, laces, embroideries, eyelets, webbing, and inside parts that would not otherwise be seen without breaking the product down. They then tag each part adding extra detail (meta-data), and following the initial scanning process they can then move to the design process of building virtual twins. Their next step is adding extra

data elements to move into the sampling process and quality assurance testing based upon the metrology of the shoe, in this case, including the inside component measurements of the finished product. And this is just one example of a new AI use case that is finding its way into the fashion sector.

Accelerating the use of AI

The fashion value-chain is moving towards a time where AI in business will become as integral as your mobile phone or your home automated assistant in your personal life. PLM continues to grow with new modules and applications that are all built to utilise the vast amounts of data held within a typical solution. In order to deliver on AI within PLM and linked to supporting technology solutions, PLM vendors must accelerate the use of AI within each of their solutions and create a set of open APIs to allow the data to be used by supporting technologies that will be able to operate seamlessly together. This approach will deliver enormous efficiencies for each and every value-chain partner. The good news is that some vendors are currently ahead of the game and are using AI with contextual / visual search. It's now time to take the next step in re-examining the end-to-end use case of AI operating within PLM.

We can only imagine that, in the next 2-3 years, it will be as common as the kind of AI tools you use within your mobile phones or smart home devices today.

Turn the page to read more on our thoughts around open APIs, and systems operating seamlessly together.

SPEED & EFFICIENCY; CAN WE HAVE IT ALL?

When it comes to implementing PLM (and other platforms in the extended digital ecosystem) there is a great deal of consideration to take into account, before running ahead with implementing one piece of what will be a complex puzzle of interoperable solutions. One crucial consideration is around the sheer amount of administration time involved: namely time on preparation (the pre-implementation gathering, standardisation and cleansing of data that ultimately can, and will, be used by other interconnected solutions and platforms).

And another is around integration.

As digital ecosystems become more and more complex, adding more and more solutions, we need to carefully consider how we can make this complex infrastructure as seamless as possible. Especially when it comes to creative teams that won't want to be burdened with spending endless time on administration tasks - all they really want to do is to draw a quick sketch of a new idea with some basic measurements and a few callouts highlighting make-up details. It's in this case that creative teams often see PLM as a burden, rather than as a speedy and efficient creative medium.

Less is more

We have now reached a point where vendors of PLM and other extended technologies need to rethink their data models and integrations. We need to allow multiple role types to use their existing best-of-breed software, that should then interoperate seamlessly with PLM (or with each other).

We should question the value that PLM brings at certain stages of the design, development and manufacturing processing, and if it simply doesn't make sense or the administration overhead is too much of a burden, then we need to carefully consider allowing certain operations to continue outside of PLM - until we can ensure that the process is both seamless and painless! To deliver on this goal, PLM vendors must carefully analyse the time taken to create new products outside of PLM, and at the same time measure the inputs and outputs required to deliver the end result. By conducting this careful study, all parties involved will be able to measure what goes in to creating and what comes out as the finished article, and the level of time and administration that's involved in the end-to-end process.

Another output is the risk involved; for example, when we do things fast, we sometime compromise data integrity. Things don't always get recorded or stored in the rightful place, we may select colours or materials that are not yet approved, or we don't fully document the details that will enable those receiving the output to act upon the task without the need of having to come back to the originator for further clarification.

Now, having said all of this (and obviously not being able to go into the micro-level detail of what's involved in taking a product from concept to finished sample), we can't honestly and easily compute the answer that best makes sense for every business type or use-case. What we can assume is that those businesses that operate on what we'll call a "lighter touch" (e.g. less details used and shared with your internal or external partners), may
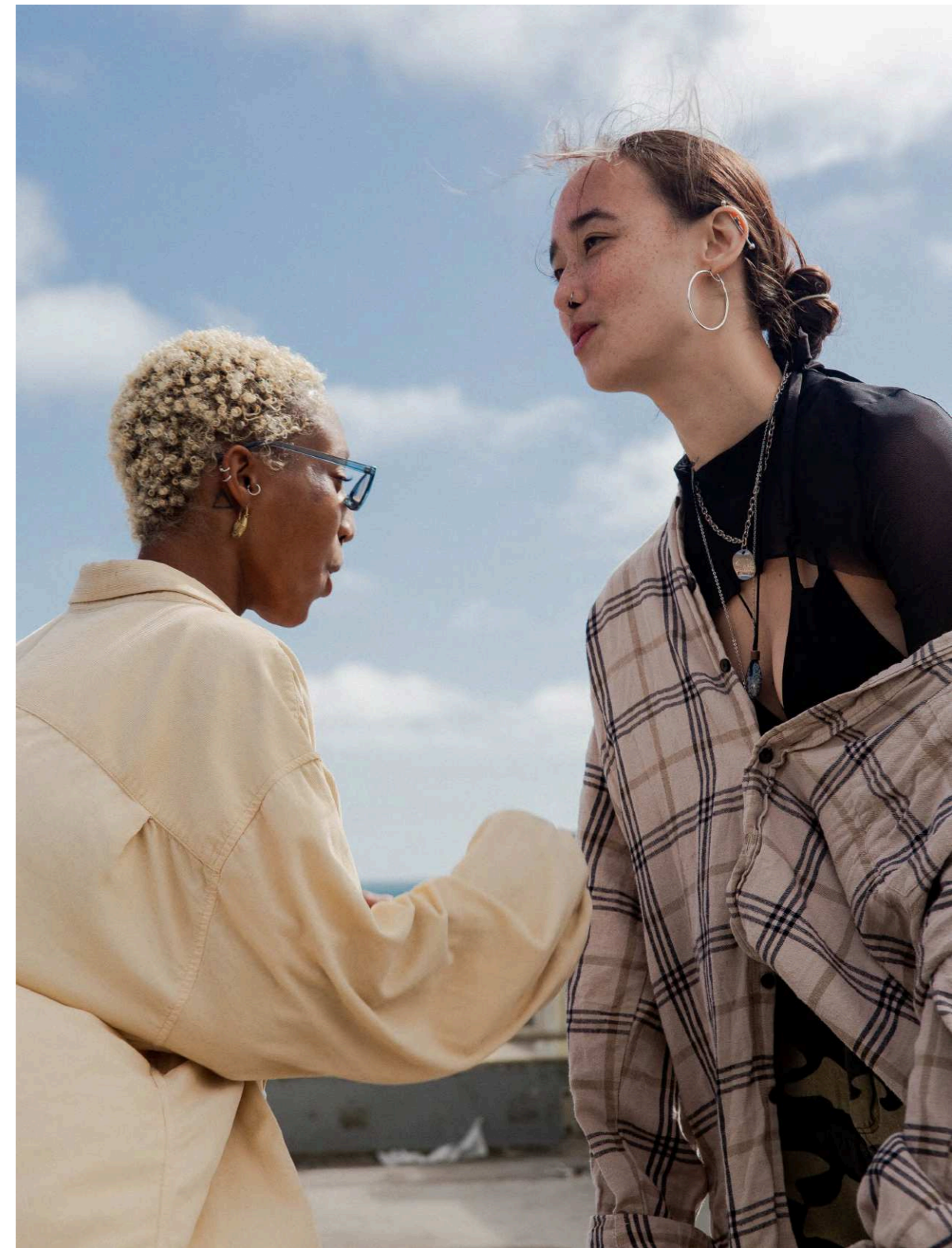
discover that their creative teams may find PLM somewhat of a struggle. Unless, of course, there are seamless, interoperable interfaces operating between the designers solution(s) stack, including for example: Trend Research, Assortment/Range Planning, 2D Creative Design (knit & weave), 2D Adobe Creative Suite, 2D Pattern Design & Engineering, 3D Design & Development, Materials & Colour Management. As you can already see this is a challenging integration question and something only the PLM vendor in question and the best-of-breed software providers will be able to answer - and only after careful studying, recording, measuring and analysing of the current 'As-Is' process by all parties.

It's only then that you can move to the next logical step of comparing the current method of analysis with an integrated, interoperable approach and timings.

On the surface, interfacing everything with PLM sounds like the perfect solution. But that's too simplistic. Why burden users with unnecessary administration when the value is not proven? It's important to know your facts, so that the vendors of PLM and other solutions will be able to onboard new users, knowing that it may appear that there is more administration involved, but in fact once you study the total time involved in operating in the current 'As-Is', disconnected model versus the interoperable model, you may find that there is a clear benefit case for one way or the other. And it's not just about speed, but also the efficiency and quality that the process brings to the entire lifecycle of a product.

The co-design model

So far, we've only mentioned 'lighter touch' businesses. The challenge becomes even greater for those companies that operate a 'quick turnaround' business model, like those operating in *fast fashion*. They don't have the time to input every little detail and they operate on a very lite Tech-Pack – a summary version, if you like, that is made up of a style summary providing key details like product type, gender, season, sample size, style number, PO number, image(s), limited styling details, a couple of supporting sketches, basic artwork image(s), size range, key measurements, main materials, target delivery dates, and costs. That's pretty much what's required by a 'co-design' model, with the remainder of the product details added by partner factories in what we could class as a co-design relationship. The final specification is usually no more than three or four pages or page views combined, whereas a brand that is responsible for every little detail of a product would be responsible for quadruple the amount of information held within the Tech-Pack and would be fully responsible for the entire lifecycle details, down to the actual shade of thread used within the finished product.

Being fast comes with its own unique challenges around quality issues – issues that can be found in materials, colours, sizing, or quality approvals. Ultimately there is a trade-off for speed, and there's no way around the fact that you simply only get out what you put into a product, and if quality is a critical requirement for your products then you will require a level of detail and integration(s) what will enable your teams to deliver on the targeted results.

Increasing APIs

The compromise for both business types is to increase the amount of application programming interfaces (APIs) within a business, out to the majority of best-of-breed solutions that are used as part of a product's design, development and manufacturing workflow.

Today, we often see PLM vendors publishing press releases to WhichPLM announcing APIs to a certain 2D CAD or 3D solution. Although this might be a great news story for both the PLM and 2D/3D solution provider, it doesn't answer any questions for users of other 2D, 3D or best-of-breed technology solutions that are not on any PLM vendor's API development roadmap.

A perfect example of successful API use when it comes to PLM is with the Adobe Creative Suite – specifically with Adobe Illustrator for sketching. And the obvious reason for this success is that the vast majority of the world's retailers, brands, and manufacturers all have one thing in common: they all use Adobe Illustrator for product sketching. But if you look at the 3D landscape in a similar way, then you could be in one of ten different 3D camps. Not everybody uses the same 3D solution, and this is further exacerbated if you design and develop multiple product types. A company working with apparel knitwear will need different 3D capabilities than one working with footwear ...or with jewellery, or hard goods. Different businesses require different 3D systems to support their multi-product workflows.

So, what's the answer?

We genuinely believe it's a fairly simple one: the PLM community must carefully consider developing standard, **open APIs** that will enable PLM solutions to integrate to other generic platforms, including 2D & 3D solutions.

You might be wondering what we mean by an 'open' API? To help answer this question, let's start by explaining the differences between a closed and an open API.

A **private (i.e. closed) API** is between two solution providers. An example might be a PLM vendor creating an API to interface with a 3D solution on behalf of their

customer that has a specific need for a seamless integration. Now, let's assume that this solution is one of the ten (or so) 3D systems that are available in the market. In this scenario the interface opens parts of an organisation's back-end data and application functionality for use by developers from both teams (PLM and 3D programmers) that are working for the retail/brand organisation. Private APIs offer substantial benefits for the retailer/brand with regards to internal and external collaborations. Using a private API across an organisation allows for greater shared awareness of the internal data models. As the developers are working for a single organisation (the shared client), in this case the communication will be more direct and they should therefore be able to work more cohesively as a three-way team (brand/retailer, PLM vendor and in this case the 3D solution provider). Private APIs can significantly diminish the development time needed to manipulate and build internal systems that maximise productivity and create customer-facing applications that improve market reach and add value to both the existing PLM platform and to the 3D vendor. And, assuming that the API allows both solution providers to resell the API to new customers, then the benefits are even greater.

In contrast, an **open API** is publicly available for all developers to access - both PLM and any of the best-of-breed 3D solution providers. They allow developers from all parties to access shared back-end data that can then be used to enhance their own applications. Open APIs can, and will, significantly increase the uptake of

PLM and, for that matter, the uptake of the best-of-breed solution(s), due to the seamless ability to interoperate with a wide variety of providers. The best example is the multiple PLM solutions that are each integrated to the Adobe Creative Suite.

However, it is important to remember that opening back-end information to third party solution providers can create a range of security and competition issues, and it's ultimately this that will continue to hold back the rollout of PLM to multiple sector types.

A shift in mindset

So far, we have been talking about PLM and typical best-of-breed 'point' solutions (the likes of 2D CAD/CAM, or 3D), but what about the emerging platform ecosystems that are already feeding these 3D tools? What about the likes of eCommerce, body and material scanners, data outputs, material platforms, and avatar developers? Looking solely at PLM & 3D simply shines the light on the fact that we need to completely rethink generic software integrations from all sides.

WhichPLM's concern is that software vendors are often looking at one particular contract interface for one particular customer, rather than looking at the bigger picture of how we should go about creating a set of open APIs for the entire PLM & best-of-breed solutions landscape.

Following the success of the Adobe Suite integration, 3D is, in our opinion, the next best starting point, but all parties will need to multiply their combined efforts to support the need to create a generic set of APIs (simple, intermediate and advanced) to the leading best-of-breed 3D platforms.

We don't expect the issue of open APIs to be resolved overnight, but unless there's a dramatic shift in the mindset of all vendors to define a common open API roadmap, then the industry will continue to progress very slowly indeed.

Let's be clear – the issue of interfaces is not halting PLM progress alone. Sometimes it comes down to things like poor user interface or experience (UI/UX). People want the latest and most aesthetic solutions; nobody wants to use a solution that is obviously way behind the times and, even if the functionality is rich, oftentimes we see people turning away and finding workarounds to avoid using software systems - PLM or other - that are not keeping up to date with the latest UI/UX trends.

Another reason for PLM solutions not being rolled out fully and utilised across the entire value-chain comes down to lack of training, including the lack of testing a users' understanding of just how the PLM software was designed and configured for their business. It may be that a particular task may take longer to complete when using a PLM solution, but for the next task inline, the process may be much faster or complete in terms of the required data that will enable each task to accelerate through the lifecycle.

When it comes to understanding software packages, how many people do you know that can honestly say they know the full workings of something as common as the Microsoft Office Suite? The answer is very few, if any, and survey results confirm that businesses are only scratching the surface when it comes to utilising the full capabilities of software solutions. And PLM is no different; we need to train people and then test their understanding to ensure that they are maximising the full potential of what a PLM solution can deliver for their business.

PLM has become very complex over the years and, going forward, we can expect this level of complexity to continue with added integrations to other third party applications that, combined, will add value to the interconnected solution platforms. Therefore, going forward, implementation teams will require both training on the configured solution, and on integrated third-party platforms, followed by deeper user training and testing to ensure that the software is known, understood and practiced as it was intended to be!

The call for seamless integrations

To enable efficient, seamless integrations operating across the end-to-end value-chain, PLM vendors and best-of-breed solution providers need to come together to create a set of integration use-case scenarios. In turn, these can be linked to the development of generic APIs that, once complete, will accelerate the integration and uptake of PLM and best-of-breed solutions operating throughout the entire lifecycle of a product.

It's time to step back and consider the big picture, and if the solution providers from both sides need a helping hand, we are always here to serve the fashion sector's best interest.

YOUR PLM PROJECT PACK

Since we founded WhichPLM in 2008, our mission has been to educate our industry on RFA (Retail, Footwear, & Apparel) PLM. This includes latest industry news, interviews with influential players, informative & educational editorial, coverage on emerging technologies and trends, vendor updates (around software as well as business-wide), deep-dive evaluations, yearly PLM Buyer's Guides like this one, online training courses and thought leadership linked to PLM & best-of-breed solutions. It also includes tailored advice to many retailers, brands and manufacturers working in fashion.

Last year was a difficult year for many of us. And for many, issues in the creation, development, management and production of our product lines came to the forefront. Although investing in any kind of technology in 2021 may seem worrisome, we believe that it's vital for survival, and that the benefits of implementing a PLM system far outweigh the challenges – especially as we start to operate within a new business model.

But, even with access to Buyer's Guides like this one, if you've ever embarked on (or began to research) a PLM project you'll know how difficult it can be to know where exactly to begin.

And so we wanted to make that process as easy as possible for our community this year, no matter if you are a small start-up, a medium business that's managed fairly well without PLM, or you're an international retailer or brand that is looking to upgrade an existing PLM solution.

So, as mentioned previously, we've compiled 'PLM's Digital Journey to Success; Your Project Pack' containing some essential, and frankly incredibly helpful, documents for any business beginning (or looking to begin) a PLM project this year.

This pack includes:

- What is PLM?
- Potential Benefits of PLM
- WhichPLM's Guidance for your Business Type(s)
- What Should a PLM Project Team Look Like?
- What to Expect from Your PLM Journey (some FAQs)
- Top Ten Things to Consider Ahead of a PLM Implementation
- PLM Architecture (a Breakdown)
- Assessment for Best-Practice Solutions (Checklist)
- PLM Process Mapping
- Best Practices to get PLM-ready
- Expert PLM Implementation Timeline

So, if you're looking to start your PLM journey, or are simply interested in learning more about what PLM could realistically do for your business, please visit our Project Pack page here, where you can read up further on each of the 11 materials available.

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 – at least in part because they contained the most comprehensive listings of key PLM vendors to be found anywhere.

We are thrilled to be able to publish the vendor listings that follow – often referred to as the "PLM bible" by project teams undergoing the difficult task of shortlisting and selecting a solution – to the widest possible audience, allowing everyone to make the most informed choice possible. Each profile contained in this section collects statistics, insights, and opinions exclusive to WhichPLM, and are designed to collectively serve as an introductory tool for any fashion organisation looking to better understand the regional and multinational players that make up the PLM market in the financial year 2020/21.

To make this shortlisting exercise simpler, we started in 2015 to apply 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 for the year in question. The same criteria have been carried through with each publication. So while smaller vendors may appear in the market itself (and may, indeed, be the right choice for a certain type of customer) these listings are purposefully confined only to those vendors who are making sufficient impact to actually steer the industry in a meaningful sense.

On the surface it may appear as though this kind of first-stage filtering of the global pool of vendors serves to artificially reduce choice, but it's important to remember that of the forty or more software vendors that claim to sell PLM for fashion, only a fraction actually offer what WhichPLM and other analysts consider to be a modern PLM product, and only these merit inclusion in a WhichPLM publication. Some vendors, for example, continue to sell outdated PDM software with a PLM sales pitch, while others who advertise PLM functionality actually better qualify as providers of extended PLM – particularly those in the area of supply chain management and planning. Other vendors whose software does meet the criteria we set out instead fell short of our minimum RFA sector turnover requirements, voluntarily excused themselves from listing, or were revealed during WhichPLM advisory engagements to lack the apparel industry expertise or experience to merit inclusion on prospective customers' selection lists.

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

In the following pages, we present overall customer figures, resource allocation by region, and the ratio of internal to external users as supplemental to the core customer data that has always been the backbone of our vendor listings. Where "N/A" appears, it denotes that the vendor in question was unable or unwilling to provide the relevant information. "N/A" should be read as "not publically disclosed".

Elsewhere, our vendor profiles continue the tradition of asking each listed supplier to provide their own insight into what they feel has differentiated them from their core PLM competitors this year, and to explain what they see as the prominent emerging trends for the near future. In a year plagued by a global pandemic, these sections are perhaps more crucial then ever in our 2021 publication.

Where actual sales to new customers are concerned we remind readers that despite our best efforts towards verification and completeness, these lists cannot be 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.

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 or CPG crossover customers, and customers whose contracts were signed far outside the 2020/21 period as valid inclusions for these pages. We are happy to report, though, that this practice occurs less and less frequently with each passing year. Where vendors chose instead to stand by their initial submissions, WhichPLM holds written confirmation from each of these suppliers that the customer lists displayed in their vendor profile are accurate, despite our own misgivings.

Although we do thank the overwhelming majority of vendors for their honesty, nothing in the vendor profiles or advertisements that follow should be considered as an endorsement of any particular PLM vendor. Even today, when low-cost, low-risk subscriptions are becoming the preferred way to buy PLM, all prospective customers should be seeking a viable and sustainable long-term partner. This means shortlisting and selecting 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 is clear about their willingness to engage in the kind of frank, open partnership that a truly successful PLM project demands.

Readers are invited, after finishing this section, to turn to our consultancy listings to continue building their picture of the apparel technology landscape, or to visit the WhichPLM website to see whether their newly shortlisted supplier(s) has submitted their solution for an impartial WhichPLM Supplier Evaluation.

+ 10
NEW CUSTOMERS OF RFA PLM

102
OVERALL NUMBER OF ACTIVE CUSTOMERS
of PLM within the RFA industry, excluding customers cited as new in 2020/2021

115,000
TOTAL NUMBER OF INTERNAL USERS WORLDWIDE

185,000
TOTAL NUMBER OF EXTERNAL USERS WORLDWIDE

110
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 aside.)

North America:	Latin America:
62	0

EMEA:	APAC:
21	25
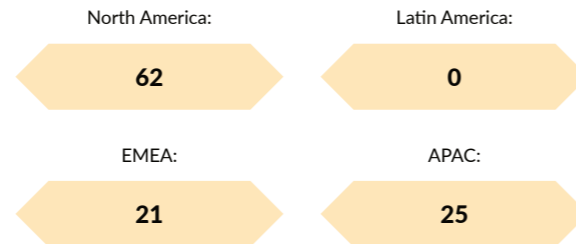
TELL US WHAT YOU FEEL HAS CHANGED AND/OR ADVANCED IN YOUR PRODUCT OFFERING THIS YEAR TO DIFFERENTIATE YOUR COMPANY FROM OTHERS IN THE RFA PLM MARKET.

Bamboo Rose's focus for the PLM application is to leverage multi-enterprise collaboration and visibility with business partners to drive process speed, innovation agility, and cost transparency.

Supplier collaboration and diversification remain vital as traditional supplier relationships face disruption while consumer demand surges during the pandemic. Buyers can identify the suppliers best able to produce the products they need through Supplier Recommendations. This tool analyses suppliers' capabilities, audit performance, sustainability metrics, transportation costs, and risk exposure to recommend the best qualified vendors for product runs.

Once working with suppliers, clients can leverage Materials Management to lower costs and reduce waste through visibility between parties on raw material, component, and finished good inventory.

Enhanced PLM cost modelling enables designers and buyers to determine the cost impact of different design and supply chain decisions.

Our Teams and Timelines capability streamlines project management and ensures partners hit pre-set milestones. The tool also alerts stakeholders if teams miss milestones. The visual timeline tool allows stakeholders to easily reference project status or projects at different stage gates.

Clients can tap into 3D tool integrations to tighten supplier iteration cycles, reduce physical sampling, and remain resilient amidst remote 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.

Consumer expectations are changing every day. RFA and CPG firms must work in step with their colleagues, suppliers, and supply chain partners to remain relevant and profitable.

From a business perspective, a major theme in the market, driven by both consumer sentiment and emerging regulatory pressure, centres around environmental social governance (ESG). Impending regulations dictate that clients must now account for more than just the quality and safety of their products and materials. They must also take responsibility for product and packaging recyclability. This requires clients to have deeper transparency and traceability in terms of product materials and sub-components, as well as with their extended supply chain partners. Retailers and brands will need deep cost modelling to respond to these market pressures while maintaining margins.

From a technology perspective, data intelligence developed in the context of business needs will be vital in building out organizational resilience. We're seeing that clients expect more than just digital insights and alerts into PLM process delays and hidden costs. They also need software tools that suggest recommended actions and simulate contingency scenarios. It's only with this type of data intelligence that stakeholders can make decisions confidently in minutes and hours rather than days and weeks.

BAMBOO ROSE br

PRODUCT LIFECYCLE MANAGEMENT

Connect your entire retail value chain
to drive supplier collaboration and product development agility

Integrate sustainability into process, operations and strategy

Drive compliance visibility and discipline throughout the supply chain

Extend order commitments closer to the point of demand

Augment and automate business decisions through data analytics and intelligence

Enable brand and design agility to market trends and consumer expectations

Learn more at **bamboorose.com/product-lifecycle-management**

CentricSoftware

+ 82

NEW CUSTOMERS OF RFA PLM, INCLUDING:

100% Speedlab, 7mesh, Angora Group, Avalon Apparel, Backcountry, Best&Less, Bettex, BGZ Brands, Bioworld, Biti's, Boll & Branch, Bonita, Busana Apparel Group, C&A Brazil, Catoma, Century Martial Arts, Charles & Keith, Chiu Shui, Classic Prep, Commando, Crystal Group, Dainese, Db, Delta Bogart Group, Delta Galil, Eberjey, Ecco, Ekonika, Frankie's Bikinis, Furhaven Pet Products, Gil Claude, Goodbaby, Grupo Malwee, Häglofs, Hezhao, Hobo Bags, Honeylove, JB Sports, JD.com, Karaca, Koton, Lafuma, Lever Style, m n m l, Mac Mode (Change Sportswear), Maixun, Mark Fairwhale, Medico Sports Fashion, MJ Style, Momokrom, Monoprix, Otabo, P.E Nation, Pangaia, Payless, Peacebird, Pentland Brands, Purcotton, s.Oliver, Santoni Shoes, Savvi, Sezane, Spire Collection, Stio, Sud Express, T2T, TechStyle, UPPAbaby, Vostock Service, Wantable, Westmoor Manufacturing, Wuxi Win, YuanFan, YunFu, Zaman Garments, ZKG

425

OVERALL NUMBER OF ACTIVE CUSTOMERS

of PLM within the RFA industry, excluding customers cited as new in 2020/2021

82,000

TOTAL NUMBER OF INTERNAL USERS WORLDWIDE

N/A

TOTAL NUMBER OF EXTERNAL USERS WORLDWIDE

117

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 aside.)

North America:	Latin America:
102	14

EMEA:	APAC:
146	114

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 are proud to have retained our position as the #1 PLM with the highest adoption rate, number of PLM replacements and new customers worldwide. Centric now has 450+ customers, representing 2,000+ brands!

Over the pandemic year we kept the innovations coming, especially for remote collaboration and execution:

- Our Quick-Start Collaboration package proved to be popular, enabling remote deployment for even faster time to value.

- Our true, end-to-end 3D development process was quickly embraced by the market. Centric's CAD-agnostic approach now includes multiple apparel-specific 3D CAD connectors (CLO, Browzwear, Optitex) as well as SOLIDWORKS, in addition to connectors to new 3D materials libraries, avatar integration and more.

- Social PLM was introduced, offering enhanced collaboration and seamless execution via threaded conversations within Centric PLM and the industry's first enterprise chat integration with Slack.

- The push continues toward complete, end-to-end PLM with additional downstream product data syndication for PIM, e-comm and more. Centric PLM is a true enterprise-wide solution with 40+ different ERP integrations and connections to legacy systems, thus bringing new users into the PLM eco-system to take advantage of a modern, user-friendly interface and single source of truth.
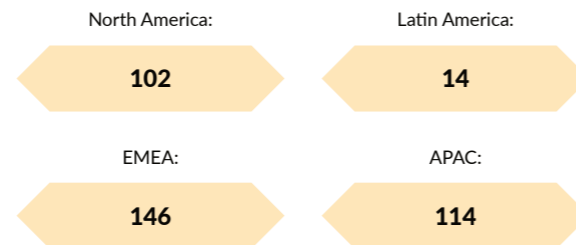
TELL US WHAT YOU BELIEVE ARE THE MOST IMPORTANT TRENDS SHAPING THE NEAR-TERM FUTURE OF THE INDUSTRY - EITHER IN TERMS OF TECHNOLOGY OR BROADER MARKET FORCES.

Undeniably the pandemic is pushing RFA PLM further into mainstream adoption with an emphasis on several new areas:

- A push toward simultaneous over sequential processes: true collaboration, centralization of information and removal of bottlenecks to allow real-time decision making and agility. Topics we have been discussing for years are now truly being realized in order to get closer to consumers and become more in tune with the market.

- 3D is being leveraged more and more throughout the development lifecycle; not only to reduce the need for samples but also to drive decision making, gauge customer interest and make product updates directly in PLM, in real time. The need to speed time to market, increase agility and reduce waste are all drivers for 3D.

- Deploying AI for forecast generation, validation of customer facing data, assisted decision-making and more.

- True adoption and deployment of sustainability and corporate social responsibility policies from concept to manufacturing.

- Companies have clearly realized that value for money and choosing the right PLM partner is critical. We have seen a record number of companies replacing other systems with Centric, including some old dinosaurs and new entrants. Buy nice or buy twice!

Chaser Brands · Flexi · Fun Sun Young · Stio · Sephora · Art and Cook
Mark Fairwhale · Sunwin · Spire Collective · Busana Apparel Group · Savvi
MJ Style · Furhaven Pet Products · Hobo Bags · Chiu Shui · Maixun · Lafuma
Backcountry · Honeylove · 7mesh · Dainese · BGZ brands · JD.com · Biti's
Delta Bogart Group · Delta Galil · Zaman Garments · Charles & Keith · Goodbaby
Mac Mode · Bonita · Sud Express · Grupo Malwee · YuanFan · Payless · Pangaia
Crystal Group · Momokrom · C&A Brazil · Karaca · JB Sports · Wantable

100+ companies
have adopted Centric PLM™ since the pandemic began

Best&Less · Ecco · Purcotton · Classic Prep · 12Storeez · TechStyle · Ekonika
Frankie's Bikinis · Santoni Shoes · Monoprix · Wuxi Win · Hezhao · Koton
YunFu · m n m l · Bettex · Pentland Brands · FILA · Eberjey · Avalon Apparel
Vostock Service · Db · Catoma · T2T · 100% Speedlab · Angora Group · s.Oliver

250+
companies

have made Centric their
FIRST & FINAL PLM

150+
companies

have made Centric their FINAL PLM,
after trying another vendor

Boll & Branch · Häglofs · Bioworld · Leverstyle · Medico Sports Fashion · Peacebird
Otabo · Westmoor Manufacturing · Gil Claude · Sezane · P.E Nation · mDesign
Commando · PEP stores · UPPAbaby · Century Martial Arts · ZKG · Zeal Concept

Find out why...
www.centricsoftware.com

CentricSoftware

![CGS logo]

+ 12
NEW CUSTOMERS OF RFA PLM, INCLUDING:
Avid Apparel, Bragard USA, Haven Apparel, Herschel Supply, Jainco, Komar Brands, LT Apparel, Michael Stars, Rent the Runway

200
OVERALL NUMBER OF ACTIVE CUSTOMERS
of PLM within the RFA industry, excluding customers cited as new in 2020/2021

9,370
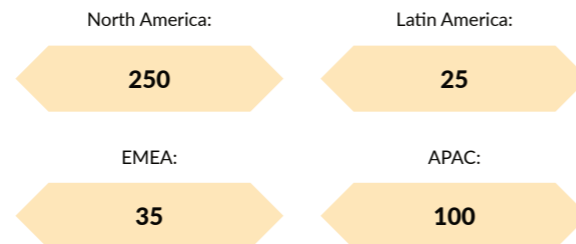**TOTAL NUMBER OF INTERNAL USERS WORLDWIDE**

22,500
TOTAL NUMBER OF EXTERNAL USERS WORLDWIDE

60
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 aside.)

North America:	Latin America:
250	25

EMEA:	APAC:
35	100

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.

BlueCherry Next™ PLM is a highly configurable, no-code solution designed to meet the needs of today's consumer brands, retailers and manufacturers. With it you can work anywhere, on any device, in any browser. There is no need to download software or apps. Suitable for SMEs and scalable for global enterprises, BlueCherry Next PLM is fast, fully featured and futureproof.

Benefits include:

- Global collaborative platform that connects designers and merchandisers with third-party suppliers

- Access to 3D rendering of designs and materials to reduce speed to market, allowing companies to replace physical prototypes with 3D samples

- The only platform that seamlessly incorporates 3D renders from product design to B2B and B2C channels

- Ability to create mood boards and storyboards pre-concept; involve buyers and consumers for validation and input before mass production

- Open API integrations for full access to the entire BlueCherry suite of supply chain solutions or third-party tools

BlueCherry Next PLM enables a true concept-to-consumer lifecycle, helping brands to be successful even during times of crisis and heightened activity. Our open approach, coupled with partnerships from industry leaders, provides users with the ability to excel.

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.

After COVID companies learned to collaborate digitally, and PLM became an essential solution for their business. While some markets, such as the U.S., are opening again, many other countries are not. PLM will continue to be crucial to connect brands and retailers with their suppliers.

Looking ahead, we will see greater product variety, shorter runs and test runs as companies try different products and then bank on the best options. Consumers do not want to see endless racks with the same style on them. They want unique, high-quality products that will last.

Companies are also looking at acquiring or absorbing other brands to enter new price points and channels.

Factories are rethinking their strategies, setting up smaller lines for shorter runs and accepting lower minimums to accommodate new consumer behaviors.

Also, there will be a more circular PLM model, with everyone working closer to consumer reactions. Designers and buyers will be held more accountable for sell-through. How did the product sell? Should we produce it again? Did the consumer like it? How was the fit? The best PLM solutions can help businesses capture the right data to understand customer experiences based on real consumer expectations, feedback and returns. Then companies can tie the design and development teams to the actual consumer reactions.

BlueCherry Next™ PLM

BUILT FOR COLLABORATION, AGILITY AND SPEED

Open API Integrations

Fully Omnichannel

DAM / PIM

3D & Digital Product Creation

Adobe® Suite Integration

Extended PLM

Flexible and Configurable Architecture

Compliance & CSR

"From designer-friendly integrated PLM to robust, integrated planning tools, our changing business requires a seamless solution. With the BlueCherry solutions' comprehensive features that are essential to current and future needs, and a team with extensive industry knowledge and experience, Michael Stars has found a partner in CGS to help deliver our apparel and accessories from design-to-consumer."

Jeff Busse, CFO, Michael Stars

cgsinc.com

COATS DIGITAL

+ 3
NEW CUSTOMERS OF RFA PLM

50
OVERALL NUMBER OF ACTIVE CUSTOMERS
of PLM within the RFA industry, excluding customers cited as new in 2020/2021

3,271
TOTAL NUMBER OF INTERNAL USERS WORLDWIDE

682
TOTAL NUMBER OF EXTERNAL USERS WORLDWIDE

8
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 aside.)

North America:	Latin America:
3	3

EMEA:	APAC:
40	110

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.

VisionPLM's functional footprint extends beyond conventional PLM, leveraging Coats Digital's unparalleled supply chain reach and industry expertise to power upstream collaboration and win where is matters.

Backed by Coats Group, our global reach and local teams empower customers on their digital transformation journey, with business critical software solutions which harness industry best practice and the latest technology to improve speed/agility, productivity/cost and sustainability across the end-to-end connected fashion supply chain.   We help brands and manufacturers optimise, connect and accelerate key processes from product development, sourcing and supply chain planning, to method-time-cost benchmarking, fabric optimisation, and production planning and shopfloor execution. Examples of recent VisionPLM advancements include:

- **VisionPLM Portal**

  Powering real time collaboration and reducing time-consuming and error prone data entry, while retaining approval control and data integrity. Collaborate on tech packs, costings, samples, and orders, leveraging instant messaging and push notifications.

- **Product Category Customisation**

  Optimise the unique way in which different product category teams work, with customizable templates, which reflect different processes and data points.

- **Super Search**

  Our enhanced search engine, with "Super Search" provides fast access to data across VisionPLM, from range planning, tech packs and costings, to critical path, orders and production updates.
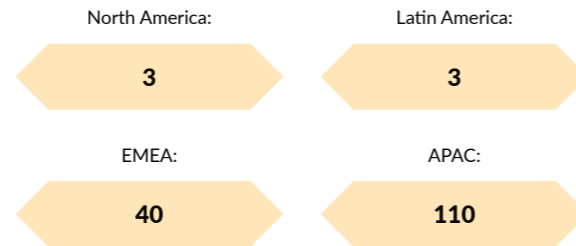
TELL US WHAT YOU BELIEVE ARE THE MOST IMPORTANT TRENDS SHAPING THE NEAR-TERM FUTURE OF THE INDUSTRY - EITHER IN TERMS OF TECHNOLOGY OR BROADER MARKET FORCES.

We expect no return to "normality" in 2021. We are instead entering a new world in which sustainable business practices are even more important for responsible companies than before the pandemic.

Driven by a multitude of forces, from new generation consumers, to culture and value driven employees, sustainable investing, regulators, and ultimately profitability, fashion businesses are increasingly recognising the need to translate sustainability rhetoric and aspirational targets into tangible action. Taking action to embed sustainable business practices and processes at the heart of a company accelerates progress towards the urgent environmental and social transformation that our industry desperately requires, as well as driving sustainable, profitable growth.

Translating sustainability targets into actions and outcomes, requires the optimisation, automation and digitization of business critical processes which support increased agility, more targeted product development, on-demand production, increased efficiency and reduced wastage, as well as the adoption of international standards for sustainable manufacturing methods and living wages.

PLM is an important part of this journey, but increasingly winning where is matters means a digital ecosystem of connected, intelligent applications, embedded with deep industry expertise, to drive transformative change and the seamless sharing of data in a collaborative, agile, transparent and sustainable fashion supply chain. #coatsdigital

+ 21
NEW CUSTOMERS OF RFA PLM, INCLUDING:
Allen Company, Arctic Lavvo, Cuts Clothing, Different Regard, Game Guard, Global Med Group, Hamricks, Luly Yang, Noho, OsloMet, ProfTool Europe, Samsøe & Samsøe, StreetWear, Title Nine, Tretorn, Trimtex, Unspun, Volvo (Apparel & Marketing), Zestt Organics LLC

254
OVERALL NUMBER OF ACTIVE CUSTOMERS
of PLM within the RFA industry, excluding customers cited as new in 2020/2021

24,481
TOTAL NUMBER OF INTERNAL USERS WORLDWIDE

14,166
TOTAL NUMBER OF EXTERNAL USERS WORLDWIDE

47
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 aside.)

North America:	Latin America:
49	3

EMEA:	APAC:
33	27
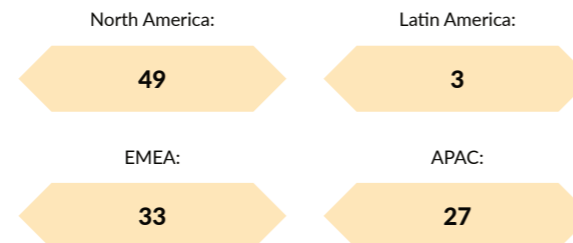
TELL US WHAT YOU FEEL HAS CHANGED AND/OR ADVANCED IN YOUR PRODUCT OFFERING THIS YEAR TO DIFFERENTIATE YOUR COMPANY FROM OTHERS IN THE RFA PLM MARKET.

Gerber's focus remains on agility and ease of adoption. We continue to deliver new releases every 8 weeks, with 5 new releases delivered from March 31, 2020 to April 1, 2021. This includes many new features directly influenced by customer feedback to support their recovery from the global pandemic.

During this period we also launched YuniquePLM Fast Start, which provided a streamlined, preconfigured out-of-the-box, digital product development solution for the SMB market. With low technical demands, it enables companies to get up and running right away.

Further, our customers benefit from Gerber's end-to-end solution from concept through production, including integration with other Gerber products and partner solutions, such as AccuMark® 2D/3D CAD, or Adobe.

With the growing number of enhancements to our design and collaborative tools such as YuniquePLM® Design Suite+ BOM Support and YuSnap+ QRcode connectivity, @mentions functionality, in app notifications & banners, and accessible robust API's, customers stay connected and share data across their different business functions effortlessly.

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.

These are unprecedented times with the Global Pandemic reshaping the industry like never before. Additionally, eCommerce and increased consumer demands, such as for sustainability, are putting additional pressure on supply chains. The most important competitive need we see for our customers is 'agility' - the ability to quickly respond to increasing change.

One of the biggest resulting trends we are seeing is a push for digitalization. Working remotely, companies are looking for a solution that will allow them to be fully connected, collaborate and share data between internal teams and their partners. Additionally, with costs rising, they also need to be able to manage the cost of their designs.

Companies need a solution that is easy to adopt and enables rapid change. From concept through production, Gerber's ability to automate the critical processes through the supply chain, meets the need for digitalization while driving efficiency, shortening development cycle time and allowing products to be designed to cost.

At Gerber, our end-to-end digital solution not only features our latest YuniquePLM and 2D/3D CAD solutions working together seamlessly, but empowers companies to integrate other solutions via robust set of APIs.

infor™

+ 5
NEW CUSTOMERS OF RFA PLM

35+
OVERALL NUMBER OF ACTIVE CUSTOMERS
of PLM within the RFA industry, excluding customers cited as new in 2020/2021

5,000+
TOTAL NUMBER OF INTERNAL USERS WORLDWIDE

N/A
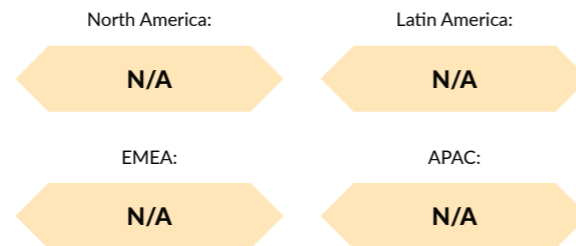TOTAL NUMBER OF EXTERNAL USERS WORLDWIDE

N/A
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 aside.)

North America:	Latin America:
N/A	N/A

EMEA:	APAC:
N/A	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.

Infor PLM for Fashion is a multi-tenant cloud service for fashion brands with support from ideation to product. It enables digital collaboration with suppliers using PC's, smartphones, and tablets. We deliver new innovations monthly that customers can adopt at their own pace, without enduring costly migrations. PLM for Fashion is configurable, easy to implement and intuitive to use.

With today's conscious consumers you should expect more from your PLM vendor. It is crucial to include the extended supply chain where production and supply chain data is tightly connected to your products. This helps giving consumers true visibility and traceability from raw material to end product using smart tagging, bringing sustainability to next level, protecting your brand.

Our standard PLM cloud service runs on Infor Operating Services, that comes with document management, workflow, integration tools, homepages, and a data lake for collecting data from PLM and other systems. It gives you a composite platform connecting your eco-systems with the ability to run workflow, reporting and analysis across all systems. You can extend the offering with analytics, Machine Learning, Artificial Intelligence and build your own applications and mobile apps using the Infor development framework.

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 continue to see a focus on sustainability but on a deeper level – consumers will ask for true visibility. They want to understand and get access to data on how each garment impacts the environment, compliance to human rights, carbon footprint etc. Another focus area is reducing waste: from raw material through production to consumers. Consumers are demanding more circular models such as repair, recycle, resell and rent to deliver a longer product lifecycle. And to tackle overproduction, tailoring of products and produce on demand are growing.

PLM plays an important role to make sure collections are sustainable and that recyclable or sustainable materials are used. But it doesn't stop there – we believe the most forward-thinking brands will need to look beyond PLM to connect the whole ecosystem, thereby getting access to more data to share with the market. Smart tagging at source and a common pool of PLM, production, supply chain and sales data will be something to invest in. Brands need a strategy for service-oriented offerings in addition to selling products. A modern technology platform that enables multiple systems to connect easily will become a prerequisite to take this exiting journey to the next level.

FASHION & RETAIL

Create fit-to-market collections sustainably

Invest in your future with Infor PLM for Fashion that delivers:

- Powerful collaboration tools to design, plan, develop, and track collections
- A flexible, scalable, modern technology platform deployed in the multi-tenant cloud
- Superior user experience and mobility to work on PC, Mac, tablet, or smartphone
- Easy integration with third-party systems
- Automatic updates at a regular cadence, to adopt innovation without costly upgrades

Learn more about making a cloud journey with style at
infor.com/solutions/scm/plm/plm-fashion

infor®

infor.com/fashion

+ 25
NEW CUSTOMERS OF RFA PLM, INCLUDING:

Alibaba Xunxi, Atelier Isa, Beams (B Jirushi Yoshida, B MING, Beams+, Beams Boy, BeAMS Dot, Beams F, Beams Golf, Beams Heart, Beams Lights, Beams mini, Beams T, Brilla, Carolina Glaser, Demi-Luxe, EFFE, Joieve, Kodomo Beams, Merrier, Nmts, Ray, Vaporize), Bill Wall Leather, Calzedonia, Hanna Anderson, IN.CO, Lener Cordier, Marni, Miss Mary, Mitsubishi Corporation Fashion, Nalesso, OVS, Payper wear, Paul Boyé Technologies, Peach John, Pinko, Reima, RGF, Roveda, Rubelli, Staff International, Sunnei, Uniformes Gary's

263
OVERALL NUMBER OF ACTIVE CUSTOMERS

of PLM within the RFA industry, excluding customers cited as new in 2020/2021

19,000
TOTAL NUMBER OF INTERNAL USERS WORLDWIDE

N/A
TOTAL NUMBER OF EXTERNAL USERS WORLDWIDE

180
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 aside.)

North America:	Latin America:
20	20

EMEA:	APAC:
165	52

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.

Kubix Link is a cloud-based platform that incorporates PLM, DAM and PIM functionalities that can be easily integrated with other legacy systems such as ERP, CMS, PCM, and WMS. The solution works best when implemented as a whole – however, to meet specific needs, we are now offering PIM as a standalone solution, with its strengthened capabilities, to enable customers to enrich, localize and contextualize their product data for different online sales channels and social media. Our latest PIM is not just for data-entry; it helps fashion companies optimize their information, by retrieving data directly from the product development teams, automatically adapting it to different channel specificities, size charts and languages. This way, information can be entered just once, and marketing teams can keep track of its completion process. This accelerates the product launch process by being a one-stop-shop for all information coming from different parts of the supply chain.

Another one of its newest and most exciting features is that it can now be integrated with Retviews, our competitor analysis solution. Together with Retviews, Kubix Link's scope has definitely the most extensive scope on the market, from benchmarking and planning product assortments to production.

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.

Due to the ongoing COVID-19 crisis, the consumer buying decision journey has changed dramatically, as shoppers no longer browse in person to make final purchase decisions. They expect comprehensive virtual experiences and services when it comes to online shopping. Store websites and marketplaces now function as window displays of closed brick-of-mortar stores. Fashion companies now have to be more digitally attuned, by presenting their brand more carefully and publishing precise product information online. Today, sizing and fit have to be well displayed online because companies can lose loyal customers by obliging them to make returns. Items now have to look not only appealing but also realistic, with 360-degree videos, automatic size suggestions, together with detailed material composition, sourcing information and sustainability compliance indexes. A bad return policy can now be a deal breaker for many customers. Companies need to reevaluate their inventory management system as well as upskill their staff for them to have more digital capabilities to meet these new needs.

With many consumers telecommuting right now, we are going through what McKinsey & Company calls "the casualization of fashion". In response, fashion companies have to rethink their product assortment to include more loungewear, comfortable fabrics, and create more product bundles out of their excess inventory resulting from COVID-19.

KUBIX LINK

Discover the ultimate consumer experience

via an ever-evolving ecosystem of PLM, PIM, DAM and more. Join the empowered fashion collective at **lectra.com**

ptc

+ 50
NEW CUSTOMERS OF RFA PLM, INCLUDING:
20th Century Studios, AFFOA (Pennsylvania Fabric Discovery Center, Drexel University), Arabia, Boxine, Caprhone Warehouse, Curry's PC World, Dixons Travel, Elgiganten, Elkjøp, ESPN, Fiskars, Freeform, FX, Gilmour, Iittala, Kotsovolos, Lucasfilm, Marvel, National Geographic, Pixar, Rorstrand, Royal Albert, Royal Copenhagen, Royal Doulton, Searchlight Pictures, Stadium, Star Wars, Sweaty Betty, Walt Disney, Waterford, Wedgwood

154
OVERALL NUMBER OF ACTIVE CUSTOMERS
of PLM within the RFA industry, excluding customers cited as new in 2020/2021

168,790
TOTAL NUMBER OF INTERNAL USERS WORLDWIDE

57,176
TOTAL NUMBER OF EXTERNAL USERS WORLDWIDE

180
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 aside.)

North America:	Latin America:
71	5

EMEA:	APAC:
64	13
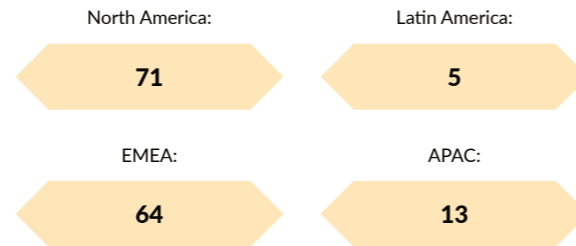
TELL US WHAT YOU FEEL HAS CHANGED AND/OR ADVANCED IN YOUR PRODUCT OFFERING THIS YEAR TO DIFFERENTIATE YOUR COMPANY FROM OTHERS IN THE RFA PLM MARKET.

Recently, PTC released FlexPLM V12 - a landmark release of the retail industry's most widely-used PLM platform. Built for remote working and global collaboration, V12 introduces several transformational innovations:

A new, modern, highly visual, and fully responsive user interface puts critical processes, features, and actionable insights at user's fingertips. Faster navigation and optimized, responsive layouts, eliminate horizontal scrolling and 'reflow' to fit almost any device, keeping users connected wherever they are.

V12 also introduces Visual Line Collaboration, giving brand and retail businesses a turnkey solution to digitizing their line review processes, as well as empowering them to make smarter forecasting and merchandising decisions, cutting line review preparation from weeks to hours.

Furthermore, V12 includes industry-first 3D collaboration features, enabling companies to seamlessly scale their use of 3D across the entire value chain. Best-in-class, bi-directional integrations with leading 3D design tools such as Browzwear and CLO provide an end-to-end digital product creation workflow. These deep and feature-rich integrations allow designers to tap into full PLM functionality from their 3D workspace.

And in a fast-moving and rapidly changing marketplace, FlexPLM provides brand and retail businesses with the tools to help them sharpen their competitive edge, with intuitive, user-configurable AI and machine learning capabilities built-in, so they can make data-driven decisions rather than relying on intuition or guesswork.

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, apparel, and consumer goods industries have faced historic disruption, compounded by longstanding challenges and market pressures. Commercialization cycles have been compressed, complex global supply chains have been stretched, and digital-native consumers dictate the speed of demand across a shifting network of channels.

As we move toward recovery, shoppers will continue to expect to see new on-trend products on a monthly – or even weekly – basis. Where it used to take a year for a new trend to emerge and make its way around the world, research from Boston Consulting Group has revealed that window has shrunk to just 3-5 weeks. To seize the opportunity presented by trend windows this short, brands and retailers will need to become more agile and more responsive, rapidly, or they risk losing ground to more digitally-advanced competitors. This means revitalizing in-house processes to get them running as quickly as the market demands, at the same time as overhauling supply chains for greater visibility, agility, and insight. This is what we define as working@digitalspeed.

To work@digitalspeed, brands and retailers will leverage PLM and other technologies to capture, analyze and use data at every stage of the plan-to-sell cycle, to predict and react to emerging trends, and to enable faster, more accurate decision-making. Their creative and merchandizing teams will be able to collaborate visually and remotely. Their global supply chains will be connected, transparent, compliant, and more able to cope with disruption. Their collection planning and SKU-level decisions will be driven by accurate information, informed by AI, and monitored by real-time analytics. Their products will be born digital, with digital twins and detailed 3D assets being deployed for in-house range building and fit sessions, as well as to sell to consumers through eCommerce storefronts, social media and marketplaces, before a single stitch is sewn.

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ptc

FlexPLM® V12
Built for digital product creation. The most highly visual, scalable and secure Retail PLM solution ever.

❯ **Transformative User Experience**

❯ **Best-in-Class 3D Workflows**

❯ **Support for Multiple Product Categories & Brands**

❯ **Visual Line Collaboration**

❯ **Cloud-Based SaaS Solution**

❯ **Enterprise-grade Scalability, Performance & Security**

❯ **IoT, AI and Machine Learning**

❯ **Ranked most functionally complete platform by IDC**

ptc® flexplm®

PLM CONSULTANT PROFILES

The goal of this PLM Buyer's Guide is to provide vendors and customers alike with the information they need to make informed investments in PLM and extended PLM technologies specifically designed for the retail, footwear and apparel industry.

Although selecting the right solution represents a significant part of this decision-making process, truly modern PLM and digital transformation projects extend far beyond the software level. And the extent of the whole business change that an effective PLM project entails means that the services of experienced, independent advisors are now as sought after and scrutinised as PLM platforms themselves.

Despite the rise of self-serve and user-configurable, cloud-based PLM, data reveals that customers of all shapes and sizes still solicit the help of third party advisors or consultants – with an especially strong correlation to business size. To put it bluntly, the work of preparing for a successful PLM project remains significant whether the solution itself is being installed onsite or off, and whether or not training and onboarding represent the same barriers to adoption as they once did. As a result, advisors and selection and implementation partners remain key components of many brands' and retailers' PLM project strategies – whether it's conducting a thorough review of legacy technologies, planning ecosystem integrations, or conducting a detailed, scientific ROI analysis.

As a result, we have invited a select few of the world's leading apparel PLM consultancy practices and advisors to provide readers with some insight into their methods, the work they have undertaken to date, and their up-to-the-minute perspective on the industry's ongoing digital transformation. This information is intended to help readers make an informed decision about which advisory practice (if any) to work with at the different stages of their PLM project.

Depending on their history, available resources, and industry experience, an advisor or consultancy practice may offer a host of different services. Some will help clients to select a solution from a thorough knowledge of the market; some will assist their clients in implementing that solution and ensuring buy-in from the executive to the user level. Some will conduct a complete evaluation of the client's apparel-specific processes and technical environment; some will work within a scientific framework to consolidate the client's product development master data ahead of implementation. Some will do all of these things and more, while others will attempt instead to bend cross-industry boilerplate methods to fit the difficult and idiosyncratic world of apparel.

It is vital for prospective PLM customers to remember, then, that not all consultants are equal. A new apparel practice from a business that has typically focused on entirely different verticals, for example, should not be compared to a proven advisor who has catered to the retail, footwear and apparel industry for a number of years. Those renowned international consultancy firms who have entered our sector in recent years may now be better established, but work still remains for them to build the kinds of methodologies, tools, and process frameworks that more experienced, apparel-specific consultants should boast as standard.

Conversely, larger consultancy practices can – and more than likely will – leverage international reach and a comparatively large pool of strategic resources to provide more comprehensive management services than their smaller, more specialised counterparts. This may prove to be less vital in the cloud-first market of the near future, but today it remains important for customers to make the distinction between broad strategic services and the kind of detailed knowledge that only a long-serving apparel industry specialist will have of the extended product development landscape.

Whether they are seeking remote support to make the most of a subscription solution or beginning a lengthy period of introspection and on-site implementation, customers should exercise caution when it comes to locating a truly independent and impartial advisor. Many consultancy practices obtain the bulk of their work from a single vendor in a partnership arrangement. And although this does not necessarily imply that the business is tied exclusively to that vendor (indeed, many practices have established partnerships with more than one PLM vendor) it does increase the likelihood of that advisor preferring to work with a particular solution - particularly when unexpected growth has forced a vendor to effectively promote that partner to the status of preferred or primary implementer.

Customers, therefore, should continue to ensure that any third party they opt to work with is experienced with their chosen vendor, solution, and method of deployment – 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. Although automated onboarding, remote training, and user configuration are now essential in the Tier 5 market segment, vendors' internal resources – for pre-sales, sales, technical demonstration, implementation and change management – continue to be stretched by potential projects, implementations, and upgrades in the upper tiers.

Needless to say, these third parties also 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, this PLM Buyer's Guide does not contain any analysis or evaluation of the consultancy practices listed in this section. Instead, we encourage prospective clients to undertake their own due diligence when working with any third party – whether they were selected directly, or nominated (either openly or covertly) by a vendor partner.

WHICH PLM SOLUTIONS / SUPPLIERS DO YOU WORK WITH? IF YOUR SERVICES ARE VENDOR-AGNOSTIC, PLEASE SAY SO.

Kalypso is an objective provider of end-to-end PLM advisory, implementation and managed services for retailers and brands. We help our clients build on foundational PLM value and develop the infrastructure to transform the end-to-end product development lifecycle – from discover to create to make to sell – via the digital thread. To do this, we combine deep experience in strategy, process improvement, technology and organizational effectiveness with expertise in PLM platform deployments for all the leading solutions.

We work with any PLM vendor that best suits our clients' needs.

LIST YOUR IMPLEMENTATIONS OF PLM WITHIN RETAIL, FOOTWEAR AND APPAREL TO DATE, ACCOMPANIED BY THE NAME OF THE SOLUTION THEY CHOSE (WHERE THIS IS PUBLIC INFORMATION).

Kalypso does not publicly share client names. Our team has conducted over 130 PLM implementations across numerous industries, 30% with global companies over $5B in revenue.

In RFA, we have helped many clients tackle core PLM challenges as well as enable digital transformation by integrating 3D DPC, digital design and advanced analytics tools with PLM, PIM and DAM. Examples include:

- DPC architecture, process design, and integration implementation for $14B footwear and accessories manufacturer
- PLM enhancements and assortment planning integration for $1B hardgoods retailer
- Process harmonization and PLM transformation for $500M sporting goods manufacturer
- PLM transformation/implementation for a $13B retailer uniting 50+ brands and 30+ product categories
- PLM evaluation, selection and implementation for $3.5B apparel retailer

WHAT DO YOU CONSIDER YOUR PRACTICE'S STRATEGIC, TACTICAL, AND IMPLEMENTATION STRENGTHS TO BE IN THE REGION OF THE RETAIL, FOOTWEAR AND APPAREL LIFECYCLE?

Our strategic focus is on helping retailers and brands bring innovative and differentiated products to consumers – when, where and how they want them. We do this by helping senior product executives drive transformation via the digital thread, which enables a seamless flow of data connecting business processes across the value chain.

We are unique in our ability to transform end-to-end product development capabilities by leveraging an ecosystem of technologies including:

1. Foundational product technology – Deploy core applications (PLM, PIM, DAM) to facilitate product development, store/share critical data, and build the infrastructure for digital transformation.

2. Digital product creation (DPC) – Leverage digital assets and 3D design tools to create, make and sell products in a virtual and collaborative environment.

3. Advanced analytics – Harvest insights from data to make better innovation, design, development and sourcing decisions.

4. Smart connected operations – Optimize global production, manufacturing and distribution, automating factories across facilities.

For Kalypso, it's not just about technology. To accelerate scale and time-to-value, we employ industry-specific methodologies, delivery accelerators, leading practice models, and a strong focus on user adoption.

TELL US WHAT YOU SEE AS THE MOST IMPORTANT EMERGING TRENDS FOR RETAILERS AND BRANDS (PARTICULARLY FASHION, FOOTWEAR AND ACCESSORIES) IN THE COMING YEAR?

We see **rapid acceleration of direct-to-consumer business models.** Consumers expect personalized products and experiences, with heightened expectations for sustainability and social responsibility.

To respond, retailers and brands should develop a **strategic view of the digital thread** and how it can transform the way they discover, create, make and sell new products. They also need a **holistic approach to technology infrastructure** that better supports the connected enterprise, removing silos to connect processes, data and people.

For example, speed up product development processes by **designing and developing closer to the moment of demand.** Leverage **predictive and prescriptive analytics** based on consumer data to make better decisions around development ratios, assortments and order quantities. Design and develop with **digital product creation** tools, making more decisions virtually before committing to binding inventory decisions. And think globally, **sourcing via a globally distributed network** of automated suppliers and factories located near shore and offshore.

TELL US WHAT YOU SEE AS THE MOST IMPORTANT EMERGING TRENDS FOR SUPPLY CHAIN MANUFACTURING (PARTICULARLY FASHION, FOOTWEAR AND ACCESSORIES) IN THE COMING YEAR?

COVID-19 has exposed the risk of long product development cycles and just-in-time inventory management. Sourcing products from low tech factories located in only a few countries concentrated in one region of the world is no longer a viable competitive or long-term strategy. In response, retailers and brands are seeking to **diversify production into a combination of off-shore, near-shore and on-shore production facilities,** based largely on product segmentation defined by demand variability. For example, sourcing products with low demand variability from off-shore, low cost centers, while sourcing products with high demand variability from on-shore centers.

In addition, they are seeking to **transform their factories with technology and automation to achieve Factory 4.0 aspirations.** More specifically, they are upgrading operations with IoT-enabled smart equipment, with better transactional applications and with advanced analytics based on data science. The goal is to improve overall equipment effectiveness (OEE) at the factory level.

PLEASE PROVIDE THE NUMBER OF QUALIFIED DOMAIN EXPERTS YOU HAVE SPECIFICALLY FOCUSED ON IMPLEMENTATIONS IN THE RFA SECTOR, SEPARATED BY REGION AS FOLLOWS:

North America: 240+, including resources based at our Americas Innovation Center in Monterrey, Mexico and our US-based Innovation Studio. **Latin America:** We serve Latin America from our US/Mexico geographical centers, and we expect rapid expansion in this region. **EMEA** : 30+, including resources based in our European Innovation Center. **APAC:** 10+, including resources based in our Innovation Center in Pune, India.

North America:	Latin America:
240+	N/A

EMEA:	APAC:
30+	10+

KALYPSO
A ROCKWELL AUTOMATION COMPANY

Accelerate your Digital Transformation

PLM is critical to transforming the end-to-end product lifecycle via the digital thread

Investing within the next 12 months*

76%
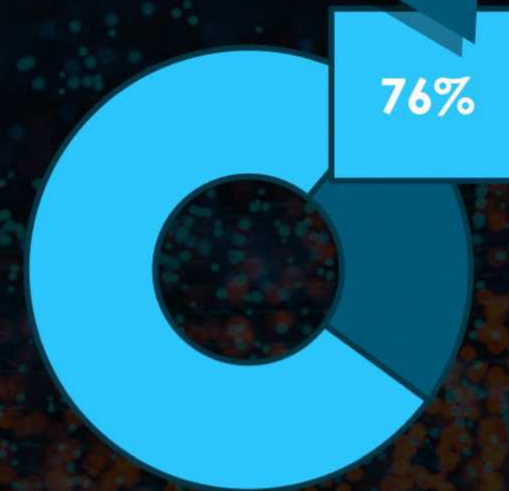
Across industries, product leaders are **spending 0.2% to 0.3% of revenues** annually on PRODUCT related technologies

Meet These Acceleration Objectives

Faster
Bring products to market 50% - 70% faster than current processes

More Virtual
Design and develop virtually to make decisions before committing to inventory

Smarter
Use predictive and prescriptive analytics to make better decisions on development ratios, order quantities and assortments

DTC-Responsive
Capture product insights to continuously inform design, development and sourcing

More Sustainable
Meet stakeholder expectations

Globally Dispersed
Sourced via a globally distributed network of more innovative, automated suppliers and factories

*****Source:** Annual Survey on Digital Product Creation Maturity in Retail, Footwear & Apparel. Kalypso, 2018

kalypso.com/plm

WHICH PLM SOLUTIONS / SUPPLIERS DO YOU WORK WITH? IF YOUR SERVICES ARE VENDOR-AGNOSTIC, PLEASE SAY SO.

Infor PLM for Fashion

LIST YOUR IMPLEMENTATIONS OF PLM WITHIN RETAIL, FOOTWEAR AND APPAREL TO DATE, ACCOMPANIED BY THE NAME OF THE SOLUTION THEY CHOSE (WHERE THIS IS PUBLIC INFORMATION).

Ptex Solutions have been involved in 60+ Infor Fashion PLM (earlier known as Freeborders PLM and Lawson Fashion PLM) implementations. Below are the names of the recent customers where Ptex has implemented PLM.

- Future Retail, India
- Salling Group, Denmark
- The Apparel Group, USA
- Dynamic Designs, USA
- Outpac Designs, Hong Kong
- Horseware, Ireland
- LTP Limited, Lithuania
- Vida International, USA
- Fristads Kansas, Sweden
- LC Waikiki, Turkey
- Rocky Brands, USA
- Fred Perry, UK
- Voice, Norway
- Graniti Fiandre, Italy (CPG industry)

WHAT DO YOU CONSIDER YOUR PRACTICE'S STRATEGIC, TACTICAL, AND IMPLEMENTATION STRENGTHS TO BE IN THE REGION OF THE RETAIL, FOOTWEAR AND APPAREL LIFECYCLE?

Ptex Solutions has successfully implemented PLM for companies in a number of countries in North America, Europe, Asia and Australasia, enabling retail, apparel and footwear to deliver superior business results by harnessing the power of technology.

The team reflects a fine balance between fashion and technology expertise. Experienced, efficient, effective, engaging and thoroughly professional, Ptex's team embodies the customer-focused approach that differentiates the company. Business consultants have either graduated from fashion institutes or they have worked in the industry prior to joining the company. With more than 15 years of implementation experience, the consultants are expert solution providers who business know-how to be able to anticipate common problems, proactively map typical business requirements and deliver solutions.

TELL US WHAT YOU SEE AS THE MOST IMPORTANT EMERGING TRENDS FOR RETAILERS AND BRANDS (PARTICULARLY FASHION, FOOTWEAR AND ACCESSORIES) IN THE COMING YEAR?

Sustainability has been discussed conceptually for many years, but has recently gathered momentum and become a key driver for organizational change. There is a visible shift from fast fashion toward slow fashion (sustainability) with the goal to move toward circular fashion. Brands and retailers that are socially and environmentally sustainable and transparent about their business practices are seeing greater consumer support.

These aren't fleeting trends, but reflective of a larger change in mindset. From companies to consumers, there is a demand to make the mind-to-market process more mindful. Instead of beginning with companies and ending with customers, this process is moving toward beginning and ending with customers. Every step of the process- from design to development and distribution – will need to include sustainability as a key focus. In terms of touchpoints, the implications are therefore rather wide and stretch beyond supply chain management to customer upcycling or company recycling.

In order to achieve, and indeed deliver on these goals companies will need to use technologies like PLM, and other supporting best-of-breed solutions.

TELL US WHAT YOU SEE AS THE MOST IMPORTANT EMERGING TRENDS FOR SUPPLY CHAIN MANUFACTURING (PARTICULARLY FASHION, FOOTWEAR AND ACCESSORIES) IN THE COMING YEAR?

In keeping with the shift toward sustainability, consumer demand for a "greener" and more transparent supply chain has increased. The challenge for fashion companies will be to balance sustainability with agility across the supply chain.

Today's consumers want to know details of the entire value-chain: from main manufacturers to material and raw material suppliers. In terms of supply chain, this means that driven by a greener design, the entire process will need to reflect sustainability. For instance, the need for "green" suppliers might mean that supplier selection could be based on level of vendor energy efficiency or impact of material on the environment. Similarly, value-chain transparency might mean tracking of material certifications and standards during procurement.

Given the significant increase in information tracking, companies will need to leverage technology to ensure a "green" supply chain that is agile. Supply chain technology integration will need to extend beyond the company to include all value-chain partners as well as customers.

PLEASE PROVIDE THE NUMBER OF QUALIFIED DOMAIN EXPERTS YOU HAVE SPECIFICALLY FOCUSED ON IMPLEMENTATIONS IN THE RFA SECTOR, SEPARATED BY REGION AS FOLLOWS:

We have a team of 40 Business and Technical Consultants. All of them are based in India. However, they have travelled to many countries for Implementation. This includes US, UK, Europe, UAE, China, Singapore, Hong Kong and New Zealand.

North America:	Latin America:
N/A	N/A

EMEA:	APAC:
N/A	40

TECHNOLOGY: REDEFINED
SUSTAINABILITY: ENABLED

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THE 2021 PLM LANDSCAPE

The PLM market for retail, footwear and apparel is now a mature sector; it is firmly coming down the longtail of adoption. In fact, it has been a mature market for many years since the smaller to medium companies started to deploy PLM into their workflows - WhichPLM has been plotting the growth of PLM since its original inception in 2002, and in detail for well over a decade since forming the WhichPLM business. Ever since our first days we have researched and analysed each of the PLM vendors and their sales that have been made exclusive to WhichPLM. Today we continue to maintain and track the global PLM installed base, using rich and deep datasets, that allow the team to slice and dice the installed base providing insights and intelligence coming from the market.

PLM has evolved from being what was a multi-million dollar implementation, that started out as fully-custom solutions (toolbox) accessible to just the largest Tier 0, 1 - multi-billion $ enterprises, to being a simple off the shelf turnkey service as it is ever likely to get.

In previous years, the 'PLM Market Analysis' sections within these publications contained insights into the customer data for each year in question: number of sales by tier and by location contrasted with the year previous; maintenance, services and implementation costs; and an overall market value for the year. However, over the last few years we have watched as the RFA PLM market shifted from being concentrated around sales to mid-size businesses and upwards, to being dominated - in volume terms - by small businesses with turnovers below $100 million per year. Last year's data (fiscal year 2019/20), as we thought, did not contain many revelations. In 2019/20, sales to small-to-medium companies accounted for close to 80% of the entire PLM market, leaving the WhichPLM team in little doubt that PLM had reached a level of accessibility and affordability that makes it both indispensable for brands and retailers of any size, and, it must be said, not all that dynamic from a sales point of view.

As true multi-tenant platforms and public cloud architectures have emerged, and incorporated service, maintenance, and implementation costs within one highly configurable offering, it has become increasingly clear that this approach represents the future of PLM for the vast majority of the market. We reported that all but 20% of PLM sales in 2019/20 year were – more than likely – made using this low code 'configurable' model or other variations very much like it. This is not to say that the PLM market for retail, footwear, and apparel has remained static in other ways over the last 12 months, though. Geographical variations, cost competition, and new developments – there is arguably more to say about what PLM can do and how it should be used than ever before, which is why WhichPLM is committed to producing exclusive content each and every week on our website that is laser-focused on each of the core PLM modules, processes and best-of-breed solutions that operate seamlessly with PLM solutions, and how they can be used together to create value in both current and future added value implementations.

Despite the pandemic that has ravaged the industry this past year, we have seen the rate of innovation skyrocket now that PLM is in the hands of everyone. We're now in a position where a simple startup could use a multi-tenant offering for a fraction of the cost of a 'fully fledged' implementation. We've reached the mass market in terms of product maturity, although there is still work to be done to seamlessly connect best-of-breed solutions, so we simply have less and less to say each year about PLM market maturity and dollar value.

Our Approach in 2021

The 'PLM Landscape' that spans the next few pages is, therefore, the first of its kind. We have re-examined the kind of insight that buyers of PLM in 2021 and beyond need. **This year's exploration of the 'PLM Landscape', then, looks at more than a decade of WhichPLM expertise and market analysis.**

Since our beginnings in 2008, we have been tracking the RFA PLM marketplace, carefully recording every sale we have come across. Now numbering in the thousands, we have a carefully curated database of PLM implementations globally during that time - something we know that no other analyst firm, vendor or educator possesses. We believe the time has come to share some key insights from this rich database. And so, our approach this year is to do just that.

In the coming pages you will find exclusive insight into the overall PLM landscape. Any data shown is collected from 2008/09 up until the point of publication of this Guide - meaning that whilst the sales made and recorded within the vendor profiles in this year's publication have been analysed, they have not been analysed alone. They have been analysed in conjunction with sales over the last decade and more, to show the most accurate and unbiased snapshot of the entire PLM landscape to date.

As always, WhichPLM is grateful to each of the vendors that voluntarily provided their information this year (most of whom can be found in the PLM Vendor Listings earlier in this publication) and in previous years, and to all technology vendors that share our desire to build a unique, transparent analysis of the global marketplace year on year. On the whole we remain impressed that so many companies remain committed to ensuring that the market operated under the eye of unbiased analysts who are equipped with accurate information. Without the information given willingly by vendors year after year, we would not have been able to share such a concise view of the overall PLM installed base globally in the coming pages.

In this section you will find the following breakdowns (percentages) into the overall PLM installed base for RFA: by tier, by country and region, as well as by business type (retailer, brand, manufacturer etc.). Following this you will find some exclusive insights into particular specialities (sportswear, accessories, womenswear etc.), as well as key regions and trends to pay close attention to in the coming twelve months.

Directly after this 'PLM Landscape' section, we strongly recommend you turn the page to 'The Evolving Extended Ecosystem' for an overview of what we see as the cornerstone technologies in our industry today and in the near-future. From there, this publication closes with some guidance for PLM customers, vendors and consultants.

Previous Years' Sales

For any readers wishing to obtain the sales data for the 2020/21 financial year alone, our new PLM Landscape model has negated the need for this (for reasons stated above). If you so wish, however, the complete back catalogue of WhichPLM publications (including our 2020 Buyer's Guide, 2019 Buyer's Guide, 2018 Buyer's Guide, and the Annual Editions that preceded them) can be accessed free of charge from our website.

Should you wish to discuss any changes to the RFA PLM market that we have not made explicit in this publication, please feel free to obtain copies of our previous research – or contact us via our website if you require something more bespoke.

Our Qualifications

This PLM Buyer's Guide and the other downloadable publications that preceded it form only a high-level summary of WhichPLM's continuous industry analysis, speaking engagements, and commentary.

Across all these different facets of our business, WhichPLM has come to occupy a uniquely privileged position, having been involved in the design and development of the very first PLM solution, being laser focused on modules and processes, evaluating the maturity levels of PLM, helping to create new process developments and introductions of best-of-breed solutions, allows 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 and existing customers of RFA PLM since 2008, and our audience has grown in absolute terms each year since the company was established.

- Our editorial and executive board has deep, international industry knowledge and expertise – born out of hands-on experience of the design, development, selection, and implementation of apparel-specific PLM solutions for over twenty years and a long list of other digital solutions that can be found on our sister site The Interline.

- As the founding fathers of RFA PLM, we believe we are the only ones who have been tracking the market from the beginning (and continue to do so), making us uniquely positioned to offer detailed insight into the overall marketplace landscape.

- WhichPLM has benchmarked most of the market's leading solutions and vendors, and we have made all of these evaluations freely available through our website. Readers looking for a detailed look at the capabilities and business potential of a possible PLM partner will gain a lot from reading these evaluations.

- We act as advisors to many of the world's leading brands and retailers, that in some cases are already on their second or third PLM implementations. We evaluate PLM solutions and vendors on their behalf, to help separate marketing 'spin' from reality, and to help them make measurable informed scientific evaluations, that are linked to their own unique set of circumstances and value-drivers. We help businesses around the world to reimagine the end-to-end 'concept-to-consumer' digital landscape that encompasses many existing and future technologies that, working in conjunction with PLM, can help to deliver a seamless, frictionless value-chain loop to their businesses.

- Our team has worked alongside all the market's primary vendors in a range of different capacities, but these relationships do not colour our analysis; our publications and services remain entirely unbiased.

- Our publications are routinely cited as vital reading material for both PLM implementations and enterprise-scale digital transformation initiatives by the world's biggest brands and retailers. It's not only the biggest names, but also SMEs that also have the vision and belief to challenge the status quo.

The RFA PLM Market by Tier

Since we first began analysing the RFA PLM market, we have taken great care to segment each PLM sale we record into Tiers based on the size and turnover of their business. This process has been fundamental to our analysis in previous Buyer's Guides, since the monetary value of a PLM sale to a large, multinational organisation (across software licensing, implementation services and maintenance) will be much larger than a sale to a single-territory, boutique brand – even though both of these would appear equivalent were we to only look at the quantity of sales for any given year. Please take a moment to read this section to understand how we segment PLM customers.

For clarity's sake, our customer Tiers for retailers and brands are delineated as follows:

- **Tier 0 -** Also known as the "super tier", customers who fall into this category demonstrate annual revenues in excess of $10 billion, and are typically multinational organisations.

- **Tier 1 -** With revenues of between $1 billion and $9.99 billion, Tier 1 customers may share equal domestic renown to their larger counterparts, but lack the sheer sales volume and international impact that would elevate them to the super tier.

- **Tier 2 -** Encompasses a wide variety of retailers and brands in what is commonly referred to as the "mid-market". These companies demonstrate revenue of between $500 million to $999 million.

- **Tier 3 -** Takes in those smaller organisations that fall below the revenue threshold of Tier 2 – typically single-territory or boutique retailers and brands with revenue from $100 million up to $499 million.

- **Tier 4 -** This Tier encompasses businesses – typically emerging designers, extremely small brands, or retail startups – that fall below the Tier 3 bracket, turning over between $50 and $99 million per year.

- **Tier 5 -** Introduced in our 2018 Buyer's Guide as a way to provide more granular insights into PLM adoption among small businesses, Tier 5 captures any company whose turnover is $49 million or less per year.

Tier	Percentage of PLM installed base for RFA
Tier 0	6.4%
Tier 1	13.3%
Tier 2	6.5%
Tier 3	14.3%
Tier 4	22.6%
Tier 5	36.9%

Almost 50% of the world's largest 200 fashion companies (by revenue terms, according to FashionUnited) have installed a PLM solution. And in some cases a number of these companies are into their second or even third implementations, transitioning from the original, heavy customised solutions to the modern day, configurable, lower cost solutions. It's important to note that many of these companies are not singular businesses and represent tens of brands under their parent company names. So what may come across as 100 company names in tier 0, could in fact actually represent more than 1,500 brands.

In the high-end of the market (tiers 1 and 2) there are still many hundreds of companies that have not yet on-boarded a modern PLM solution, and are still operating on what we call a 'Microsoft PDM' system, usually made up of email, Excel, PPTs and similar solutions that help to communicate design and development communications between all parties. Overall, tiers 1 and 2 represent around 20% of the entire installed base for RFA PLM thus far. Although, as with tier 0, this installed base - combining businesses with revenues between $500 million and $9.9 billion - may represent well

over a thousand brands when you consider that each business will include multiple brand names under the parent company.

In the main, tiers 3, 4 & 5 are what we call the smaller businesses. These smaller tiers make up the vast majority of today's PLM installed base, at nearly 75%. They tend to be more singular retail and brand names, although that's not exclusive as some of the larger players (mainly in tier 3) will also have multiple brands under the parent company name.

So, across these tiers we estimate PLM is being used to support around three thousand retailers, brands, and manufacturers. As with tiers 1 and 2 the industry has only scratched the surface when it comes to selling and installing PLM solutions. Following our own research and analysis, we estimate that there are literally thousands of companies from around the world that are still operating on a fragmented PDM-like solution stack, and we expect these companies to continue to expand and onboard a modern PLM solution to support their ever-growing ambitions to deliver greater efficiencies and benefits for their businesses and partners.

The fashion sector is now looking beyond a single PLM backbone, and is starting to connect a broad range of solutions that, at some point in the lifecycle of a product, will share their inputs & outputs to PLM, the 'system-of-record'. We are now starting to see those businesses moving upstream to connect their tier 1 factories to their tier 5 farmers. It's now only a matter of time before we will be able to complete the 'infinite data loop' starting from the creatives and going to the consumers.

The RFA PLM Market by Location (Region)

When a new-name PLM sale occurs, our analysts assign it a location at the country level, as well as bundling it into the appropriate sales and business region: the Americas, EMEA (Europe, the Middle East and Africa) and Asia-Pacific. This assignment is done at the brand headquarters level, which is important in two different scenarios. Where a retailer or brand operates multiple offices, all of which are now potentially using the chosen PLM solution, we assign the sale to the headquarters on the company's masthead unless we're specifically told to otherwise, or unless a regional subsidiary is actually the company named in the PLM agreement.

Where a parent company or group operates multiple brands, we will assign the sale to the appropriate region for the brand, not the parent. Tied to this, although some luxury groups have historically mandated that every house that operates under their umbrella adopt the same PLM, ERP, and other enterprise solutions, this practice appears to have run its course, and group-owned brands that design and bring to market unique products today have more latitude to approach the market and make decisions on their own terms. Nevertheless, if a PLM vendor has claimed a group as a customer, we always insist on drilling down to the brand level and assigning the sale to the location of the brand's headquarters.

Region	Percentage of PLM installed base for RFA
Americas	44.7%
EMEA	41.1%
APAC	14.2%

It will come as no surprise to anyone who has read any of our previous annual publications - or anyone who has been tracking the market even somewhat over recent years - that the Americas dominate the world's PLM installed base. As stated above, many of whom are now on the second or third generation of PLM technologies, taking advantage of the continued architectural and software advancements that have taken place over the last twenty years, since PLM first came to the fashion sector.

It's clear to see that, today, these same leading companies are now pushing the technological envelopes when it comes to expanding PLM use cases; no longer is the scope to simply connect the silos within their headquarters, but rather its how to leverage PLM to manage it's tier 1 to tier 5 value-chain partners operating across the globe, from factories all the way down to farmers. Furthermore, these leaders continue to challenge the status-quo of how things have been done in the past and are now reimagining a new future that will join up what we call the infinite 'value-loop' with no ends, but rather a continuous loop of data that will help to deliver greater insights and improved intelligence. This will be leveraged to increase efficiencies on a scale never before achievable, and in turn will help to support greater sustainability and transparency for all value-chain partners.

Europe continues to make gains in deploying modern PLM solutions, and is quickly closing the long-standing sales gap on the Americas. Another less obvious insight is that the European installed base is far more complex than that of its American counterpart, with a greater mix of tiers, especially toward the smaller end, and also as a rich mix of sector types including its dominance in luxury retailers and brands, many of whom operate local manufacturing within or near to their country of origin, that translates to a more advanced, integrated PLM value-chain, helping to amalgamate design, development and manufacturing solutions.

In recent years, Asia has begun to expand its use of PLM to help service it's American and European retail and brand customers, many of which operate on a FOB (Free/Freight on Board) sourcing basis and some that now use a design & co-create model. Added to these types of companies, there is a growing expansion of Asian retailers, brands and sourcing businesses that are now servicing their own domestic markets, some of which have turned from suppliers of western retailers and brands, to become their own local retailers or brands, with physical stores and/or operating online eCommerce platforms. We expect that it's only a matter of time before Asia catches up to the Americas and Europe when it comes to deploying modern, and in some cases, more expansive PLM platform ecosystems.

These next generation users will, and already do, expect more than the traditional PLM solutions. They tend to be more tech-savvy and see challenges as opportunities to overcome and improve, and are already mixing platforms, helping to deliver solutions within solutions that offer new frictionless possibilities.

Although we have seen increased sales in recent years, it's surprising that PLM has not yet really been able to penetrate South America. It's possible that one of the reasons for this is that it's customer base is operating on a pure FOB basis and that the retailers and brands of the USA & Canada are still only sharing PDF Tech-Packs rather than fully integrating their value-chain partners to their PLM platforms. Once businesses on both sides wake up to the opportunities of integrating their suppliers into their extended PLM ecosystems, only then will we see South America expanding its use of PLM, and that in turn will switch them onto how PLM can help enhance their own businesses in the same way that it's now spreading across Asia.

The model is certainly changing, and if we revisit the overall numbers in another few years, it's likely we will see a much smaller gap between APAC, The Americas and EMEA.

The RFA PLM Market by Location (Country) - % of PLM installed base for RFA up to April 1st 2021

Country	%
United States	37.78%
United Kingdom	8.06%
France	7.18%
Italy	7.08%
Germany	5.25%
Canada	5.02%
China	4.58%
Australia	2.65%
Sweden	2.54%
Hong Kong	1.88%
India	1.88%
Norway	1.77%
Spain	1.44%
The Netherlands	1.33%
Turkey	1.27%
Japan	1.05%
Switzerland	0.88%
Denmark	0.83%
Mexico	0.83%
Russia	0.66%

Country	%
Brazil	0.55%
Belgium	0.50%
South Africa	0.39%
Finland	0.33%
Israel	0.28%
New Zealand	0.28%
Sri Lanka	0.28%
Greece	0.22%
Singapore	0.22%
South Korea	0.22%
Tunisia	0.22%
Austria	0.17%
Bangladesh	0.17%
Poland	0.17%
Portugal	0.17%
Taiwan	0.17%
United Arab Emirates	0.17%
Chile	0.11%
Colombia	0.11%
Costa Rica	0.11%

Country	%
Pakistan	0.11%
Philippines	0.11%
Thailand	0.11%
Vietnam	0.11%
Taiwan	0.05%
Botswana	0.05%
Bulgaria	0.05%
Dominican Republic	0.05%
Guatemala	0.05%
Indonesia	0.05%
Jordan	0.05%
Lebanon	0.05%
Lithuania	0.05%
Luxembourg	0.05%
Macedonia	0.05%
Malta	0.05%
Romania	0.05%
Trinidad & Tobago	0.05%

Fashion-related PLM solutions are now installed in almost sixty countries around the world - many of which you may be surprised to see on our list. Ten years ago this would have been less than 20 countries. And we believe we can expect the number of installations to increase ten fold in the coming years, with PLM becoming as common as a 2D pattern CAD system is within fashion today. Due to the sheer number of fashion businesses around the globe, we still have a long way to go before PLM is as common as having Microsoft Word installed on each of your PCs or Macs, but in the relatively short time that PLM has been available its market share continues to expand at pace.

The USA, the UK, & Israel

These three regions all have one thing in common, and that is that they are well on their way to rolling out the COVID-19 vaccine to their adult populations. In fact, less than one month before this Guide was published, the figures showed that more than 730 million doses of the coronavirus vaccines had been administered, in 160 countries worldwide.

However, there are vast differences in the pace of this critical progress. As we saw back in April, the EU was now in a third wave of the pandemic, which meant further restrictions, curfews and variations of 'lockdowns' in different parts of the world. The good news is that, at the same time, we began to see vaccine supplies increasing and being dispatched to a greater number of countries around the world. But many more, especially those countries in worse economic situations, were and are still waiting for their first shipments to arrive.

Most global governments started by vaccinating those over 65 years old, and then began moving through the age groups in descending order. In the USA, the UK, and Israel the vaccine quickly began reaching younger working adults, helping to open up the high streets and thus helping to start the retail wheels turning again - which, in turn, will help to increase orders across the value-chains.

The USA is the world's largest retail consumer market, with a GDP of $21.43 trillion, so there is a direct correlation between fashion in the USA and in the rest of the world; the earlier the USA comes out of lockdown (of course, when it is safe to do so), the sooner the global RFA industry starts to get back on track to it's 2019 'glory day' numbers. The USA, like most of the top retail countries in the world, will have experienced a long list of high street retailer casualties that have fallen foul of the pandemic, some of which will never recover, whilst others will have lost sales to online retailers that have continued to get this lost footfall. The same can be said for many countries in the EU, where long lists of retailers and brands have suffered heavily from the pandemic fallout and will sadly never be able to recover. The only winners are clearly the eCommerce players that have bought up the best of the high-street names and have brought them into their online businesses.

Beyond the world's largest consumers of RFA related products, there's also the question of the manufacturing value-chain, and the effects that the pandemic has had on them. At the early part of the pandemic, those companies that could still produce products turned their attention to PPE products of all types, and in many ways this was a welcome challenge in that most of the high-street retailers had greatly reduced their orders or sadly stopped production completely. Now they were producing again. But worse still was that many of the manufacturers either had to accept slow payments or cancelled orders / payments. We have stated many times since the start of the pandemic that business as we know it will never be the same, and manufacturers will need to accept smaller orders, with complex stock keeping units (SKUs), which will require extra effort by all partners to manage the complexities. And for that very reason, we expect to see greater spending on new technology ecosystems that, over time, will be designed and rolled out to operate seamlessly from the retailer or brand through each of the tier partners, starting with tier 1 factories all the way to tier 5 farmers!

Both the USA & UK governments got caught out when it came to the supplies of PPE equipment. This has since led to developing new, locally based manufacturing units, and ones that are using what we sometimes refer to as 'leapfrog technologies' including the use of new automated and connected hardware and software devices.

China

Some countries have seen their economy grow, like China by 2.3% in 2020 [National Bureau Statistics of China]. But during a year when the crippling pandemic plunged major world economies into recession, China managed to avoid lockdown and clearly came out on top. The country scrapped its growth target last year for the first time in decades as the pandemic hit the economy. GDP shrank nearly 7% in the first quarter as large swaths of the country were placed on lockdown to contain the spread of the virus. Industrial production was a particularly big driver of growth, jumping 7.3% in December from a year earlier. The Chinese manufacturing sector powered ahead supplying PPE equipment, while much of the world was struggling to equip it's hospitals with the basic PPE requirements. It wasn't just China, but also Vietnam that gained ground during the pandemic, which resulted in the

economy growing 2.9% last year from a year ago [Vietnam's General Statistics Office], better than China's forecast-beating 2.3% growth during the same period. Like China, manufacturing was widely credited for Vietnam's outperformance, with production growing on the back of steady export demands including Footwear and Apparel.

Another concern coming out of China are the reports of forced labour connected to the Xinjiang Uyghur Autonomous Region (XUAR). We have seen retailers and brands moving away from XUAR when it comes to sourcing textiles or spun yarn from the region. The result is that we have seen retailers and brands strengthening their auditing and sustainability procedures using their own on the ground resources and third parties, by conducting greater due diligence with their suppliers in China and beyond.

South & Central America

South & Central America, like the rest of the world, has been hit by the pressures of the pandemic. Even before COVID-19, S&CA were already seeing lower volume orders and, like many other countries from around the world, further complexities in the mix of SKUs. On top of this the pandemic has since resulted in issues with raw materials coming out of Asia, and lower investments from within and outside of the countries.

We are still surprised, however, to see the region falling way behind the rest of the world when it comes to deploying PLM and other related best-of-breed digital solutions. It's likely that this is due to the maturity levels of their retail and brand customers that are still operating at arm's length, meaning that they are not yet taking advantage of a joined up digital value-chain. This is an area where we are seeing a substantial change in the way that PLM is now being deployed. In recent years, PLM was implemented within the HQ of the retailer or brand and collaboration was, at best, via a portal sharing a portable document file (PDF). The good news is that, in recent times, we are now seeing PLM implementations include suppliers, at the beginning or very soon after the implementation takes place at the HQ. We would expect that this approach will help to ignite the use of PLM across the extended value-chain, resulting in tier 1 and tier 2 suppliers eventually using PLM in real-time linked back to their customers.

Many retailers and brands have done an amazing job in supporting their suppliers during these unprecedented times. The best have continued to place orders even if the orders have been smaller and more complex in terms of the SKU mix, taking into account the marketplace dynamics during the pandemic. These leaders continued paying for finished products from their suppliers, while honoring contractual agreements linked to payment terms for work-in-progress (WIP) production. Sadly, on the opposite end of the scale, we have witnessed several high-street brands and retailers cancelling orders, and refusing to pay their suppliers for WIP. And perhaps the worst cases reported, actually informed suppliers that not only would they not get paid, but could collect their finished goods from warehouses in other countries. Leading brands and retailers that truly believe in fairness and sustainability will and should shoulder responsibilities; those that play hardball in challenging times, and use unfair practices, will find that they will quickly run out of quality manufacturing sources. These suppliers will have long memories and with them new demands that will help lower their risk!

Global fashion post-pandemic

We have experienced the worst year since the great depression of the 1930s; a year of high-street closures, massive reductions in profitability, and record numbers of people losing their jobs from all around the world. If there is a silver lining then it's got to be linked to new technologies that will, and are already starting to, be deployed throughout the extended value-chain. Boardrooms and their directors the world over are looking to reorganise and innovate their businesses. It started before the pandemic hit, but many of the leading GDP countries and their businesses are starting to power ahead in connecting their value-chain partners from trend to consumer, upstream and downstream, seamlessly and frictionless. Leading businesses from around the world are looking to reconstruct end-to-end digital ecosystems - some of these changes will have been driven via the fallout of the pandemic, whilst others started several years ago and are now starting to bear fruits. One of the drivers of change is sustainability and transparency that is being driven not only by the brands and retailers, but by consumers, NGOs and governments that are demanding actions, rather than words. These drivers will accelerate technological innovations and partnering of multiple platform providers, to help deliver the digital connections that will drive the future of fashion.

The pandemic has caused great pain and challenges within the fashion industry, the outcome of which has already started to create great waves of change related to a whole host of improvements including the reengineering of processes and technology combining data that is used across the enterprise both downstream and upstream. One sector that has seen business models surge is eCommerce. Some of these businesses have bought out the ailing high-street retailers and brands that have sadly been forced out of business by the lack of footfall.

Countries from around the world are slowly beginning to reopen their economies, and people are heading back to their offices, although we can expect that the numbers will continue to be well below the pre-pandemic times. Obviously, this reduction in high-street footfall will continue to hit the high-street retailers; people have learned to shop online, many of whom will prefer the convenience, whilst others will want to get back to trying on clothes, and enjoying that tactile experience. People's behaviors will change to what many are calling the 'new normal'.

Likewise, businesses need to take careful consideration of these changes downstream, analysing the new shifts in data explosion. Just imagine how many people have moved to e-Commerce and what that means in collecting data on product purchases and how these businesses will be able to leverage the same datasets to help analyse demand in a fraction of the time that is taken by the high-street retailers - due to the very fact that eCommerce is data rich, whilst high-street retailing lacks the detail and speed to create and react. Both models have their advantages and challenges, but one thing that is clear is that we need to move fast and use data to connect sales to trends, planning to design, development to manufacturing and everything that takes place between, using a seamless on-demand driven value-chain.

The RFA PLM Market by Type

When a new-name PLM sale occurs, as well as assigning it a tier and a location, our analysts also categorise its type. This can be anything from the more obvious retailer, brand or manufacturer to distributor, wholesaler, or e-tailer. Occasionally businesses cross types and will be listed as a brand & manufacturer, or another combination.

Type	Percentage of PLM installed base for RFA
Brand	40.4%
Manufacturer	22.6%
Retailer	13.8%
Wholesaler	5.9%
Brand Group	3.9%
Brand / Manufacturer	3.4%
Other	3.2%
e-tailer / Mail order	2.8%
Supplier	2.1%
Distributor	2.1%
Designer	0.4%
Retail Group	0.4%

When we first brought to market product data management (PDM) systems in the mid 1980s, our target market was in fact manufacturing. The scope of PDM back then was to help improve communications around departments starting with a technical design that in turn linked to the cutting room and then onto the factory floor. After several years the PDM vendors started to branch out to include retailers and brands; in fact the first wave of retail clients came from mail-order businesses - the equivalent of today's e-tailers - and from there they moved onto department stores, supporting design and development of private label products. Around the same time they started to expand into brands, focusing on design and development, and faxing specification Tech-Packs around the world.

It was in the late '90s that these new customers required different solutions for their challenges of improving communications with their now offshore partners, giving way to new PLM platforms that, from this point onward, would focus primarily on retailers and brands rather than the original manufacturing sector. So much so, that over the next decade it was clear that these new requirements and new resources coming into the market had little knowledge of the original manufacturing requirements of the first PDM systems. It's interesting to see that where PDM came from (factories) is where PLM is heading back to today, joining the loop back to manufacturing and this time rather than sending faxes or PDFs, its heading toward real-time connectivity, with PLM becoming the new modern day communications platform - the likes of "Slack" for designers, developers, and manufacturers.

It's not surprising to see that retailers and brands make up over half of today's global PLM installed base, and that manufacturers are closer to one quarter. This reflects the shift from manufacturers to retailers and brands in the '90s, and the vast majority of the retailer-brand installed base came from well into this millennium. Likewise, the e-tailers with PLM installed have only come about in recent years, and already make up a few percent of the overall base - something that is expected to rise in the near-future. [Please note: e-tailers refers to those companies with an online presence only, and not those businesses operating eCommerce alongside physical stores.]

The RFA PLM Market by Specialty

When a new-name PLM sale occurs, as well as assigning it a tier and a location, our analysts also assign it a specialty. Many businesses operate multiple specialties - like womenswear, childrenswear, bags, footwear, lingerie, sportswear or outerwear - so we research their primary specialty according to a combination of annual reports, mission statements, and other company information. Where there is no clear distinction between the type of apparel the company retails or manufactures, their specialty will be listed as 'apparel' or even 'family apparel'. Likewise, where some businesses operate very niche product lines, or less common specialties, they may have been put into umbrella categories, or into 'other'.

For this section, we have highlighted some specialties of particular focus to WhichPLM over the years - not necessarily the most popular specialities when it comes to the installed PLM base.

Specialty	%		Specialty	%
Womenswear	19.1%		Furniture / Furniture Upholstery	1.5%
Sportswear	8.9%		Hosiery	1.5%
Accessories	7.2%		Knitwear	1.4%
Menswear	6.2%		Swimwear	1.1%
Footwear	6.1%		Jewellery	1.0%
Family Apparel	4.7%		Eyewear	0.8%
Uniforms / Workwear	4.5%		Streetwear	0.7%
Apparel	4.4%		Bridalwear	0.6%
Other	4.2%		Protectivewear	0.6%
Outerwear	3.8%		Automotive	0.5%
Childrenswear	3.3%		Leather / Leather Goods	0.5%
Lingerie / Shapewear	3.1%		Plus-Size Apparel	0.4%
Home Furnishings / Homewares	3.0%		Surfwear	0.4%
Bags / Backpacks / Handbags	2.7%		Sustainable Apparel	0.4%
Denim	2.5%		Dancewear	0.3%
Textiles	2.4%		Tactical Apparel	0.3%
Sporting Goods	1.6%		Technical Apparel	0.3%

When we look into PLM market segmentation, it's clear to see that womenswear retailers and brands dominate the PLM installed base. Women, according to global sales data, spend around 50% more on clothing than men. Although, when you look at the percentages, men are certainly catching up to women, and on some specialty products men are now outspending women. After womenswear, sportswear comes in second place, and when we think of sportswear we see that it comes in many different segments, often led by technical sportswear. In recent decades sportswear businesses have latched onto the 'F' word of fashion, and in more recent times it's made the transition into fashion athleisure - especially since the pandemic hit, with most people wanting to be casual and comfortable whilst on those Zoom calls!

In fourth place we have the aforementioned menswear brands and retailers, followed by the footwear sector in fifth place that, up until recent years, was one of the smaller market sectors for PLM. Footwear companies, especially new businesses that are sometimes referred to as white shoes (flyknit or fabric material uppers) versus the traditional brown shoe businesses (leathers) have started to use PLM platforms to design & develop their latest footwear offerings.

Family apparel products and Workwear come next with the latter driven to use PLM associated with the deeper technical needs of materials and product 'specifications' and certifications. Then we have a broad mix of specialty business types including Hosiery, Swimwear, Accessories, Jewellery, Eyewear, Bridalwear, Leather goods. It's great to see that PLM isn't reserved just for certain sectors, and it's now infiltrated almost all areas of fashion retail. Even Automotive and Aerospace businesses are using fashion PLM solutions to help support their soft furnishing businesses that, like lots of companies around the world, again have an 'F' fashion use case!
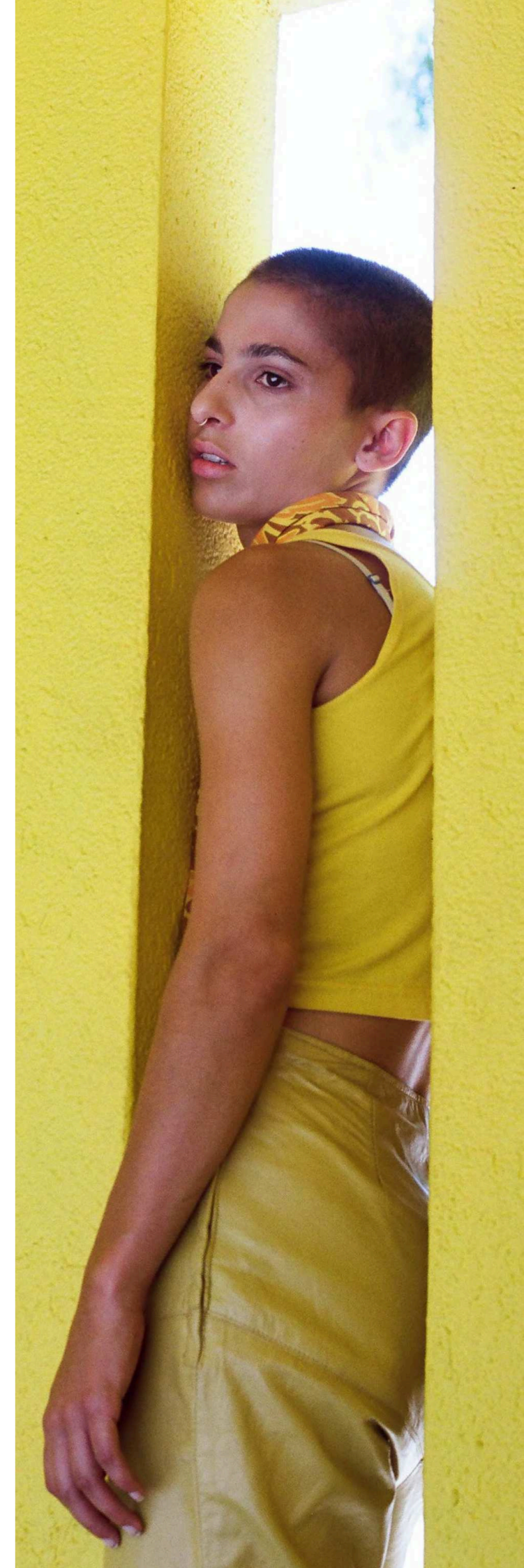
What's Driving PLM into the Value-Chain?

So, what are some of the key drivers that are now accelerating the wave of change for PLM? There are too many to discuss at length in this Buyer's Guide, but below are a few of what we consider to be at the top of the leaders' priority listings; these have been acquired whilst working together with future-minded fashion businesses from around the world that are continuing to push the boundaries of PLM.

We have already stated that businesses operating within different regions from around the world will each have their own unique drivers for change: some will be driven by expansion, some will want to transform into vertical operations, others will want to safeguard and protect their markets, and many will be driven by sustainability and transparency demands.

As stated earlier some businesses are now into their third generations of PLM and are now wanting to reinvent the way that they design and bring products to market, often these businesses are driven by the ever advancing wave of new technologies that are enabling a completely new way of doing business. Considering this last point for a second, it wasn't that long ago that the market considered 3D as a simple point solution that helped designers and developers to synthesise 3D samples on avatars, whereas today 3D has and is being seen as a potential leapfrog technology that in lots of cases negates the need for a traditional 2D pattern/last CAD system.

Today, PLM is being enabled by lots of emerging new technologies that can be used to speed up the inputs to PLM, rather than PLM being seen as a single platform with all the modules used to design and develop products. Over the years, WhichPLM has been known for saying that PLM is not a 'silver bullet', and we believe that most people would agree with us when we say that PLM is indeed the 'system of record' when it comes to product data, but it's not necessarily the system of flexibility and speed, especially when it comes to designing, developing and manufacturing products. That being said, PLM is now being driven by a growing list of outside influencing technologies that are operating at both ends of the marketplace, downstream toward the consumer and upstream into the manufacturers.

PLM, just like ERP that came before it, is in our opinion the 'data vault' for what will become the approved data (system of record), which in turn will be used to gain detailed improvements down to microscopic levels as the data cycles and revolves ever faster in what will become the design, development and manufacturing infinite-loop!

Other drivers that are changing PLM as we know it include the drive for sustainability, traceability of materials, products, certification, and fair labour relationships.

On-demand manufacturing is no longer a dream, along with personalisation-configurations, and made-to-order clothing, but rather these latter use cases are the new emerging reality as PLM evolves.

We have arrived at a new chapter that will see PLM being deployed across the value-chain in real-time to help realise these and many other opportunities, and at the outset of a PLM project implementation, rather than the latter being a mid-term, multiple phased future.

THE EVOLVING EXTENDED ECOSYSTEM

AN OVERVIEW OF CORNERSTONE TECHNOLOGIES FROM DIGITAL DESIGN TO DIGITAL STOREFRONT

If product design and development has a hub, it's historically been PLM. For forward-thinking brands, the last decade has been defined by adopting PLM as a way to consolidate, centralise, and work with a single set of unified product data across in-house departments and in the value chain. More options are emerging today that could threaten the dominance of PLM in that role, but for many brands and retailers – especially larger organisations – PLM is still, and will continue to be, the place where their critical product information lives, and it's the location that any extended process or solution that needs to make use of that information needs to integrate to.

For that reason, we have seen PLM being used as the backbone of a lot of modern brand and retail technology architectures and ecosystems. And for the same reason, we have seen its use being extended outside the walls of brand headquarters and satellite offices – with secure access being granted to trusted suppliers.

Prior to COVID, but especially in the wake of the pandemic, PLM therefore fell naturally into a role at the centre of digital transformation strategies. As more brands and retailers began to trial technologies like 3D design, development tools and IoT connectivity, and to extend their use of 2D CAD/CAM, ERP, and supply chain management in their drive to digitise, PLM became even more entrenched as the engine that would drive the end-to-end integrations necessary to deliver on their vision of a connected digital ecosystem.

Those integrations vary dramatically in their maturity and their future potential, with extremely deep, proven links between solutions like Adobe Illustrator and PLM being common enough to be considered an industry standard, compared to more ad-hoc integrations between other platforms that are not yet as firmly established. The approach to these integrations also varies, between bespoke integrations and open, documented, web-standard API hooks, with middleware somewhere in-between.

This overview sets out what the combined WhichPLM and The Interline teams see as some of the most important technologies across the entire apparel, footwear, and accessories value chain today. Many of these can exist independently of PLM, but almost all benefit in a huge way from being able to tap into a single accurate source of unified product data and assets.

eCommerce

Online selling – across DTC channels, third party marketplaces, and eTail wholesale relationships – has defined the pandemic period, and early indications from China are that eCommerce could be set to become a majority channel worldwide in the near-term future. To cater for this explosion in online sales, brands are rapidly trying to supercharge their own direct channels, at the same time as evaluating which wholesale and marketplace relationships make sense and which they should withdraw from for brand protection reasons.
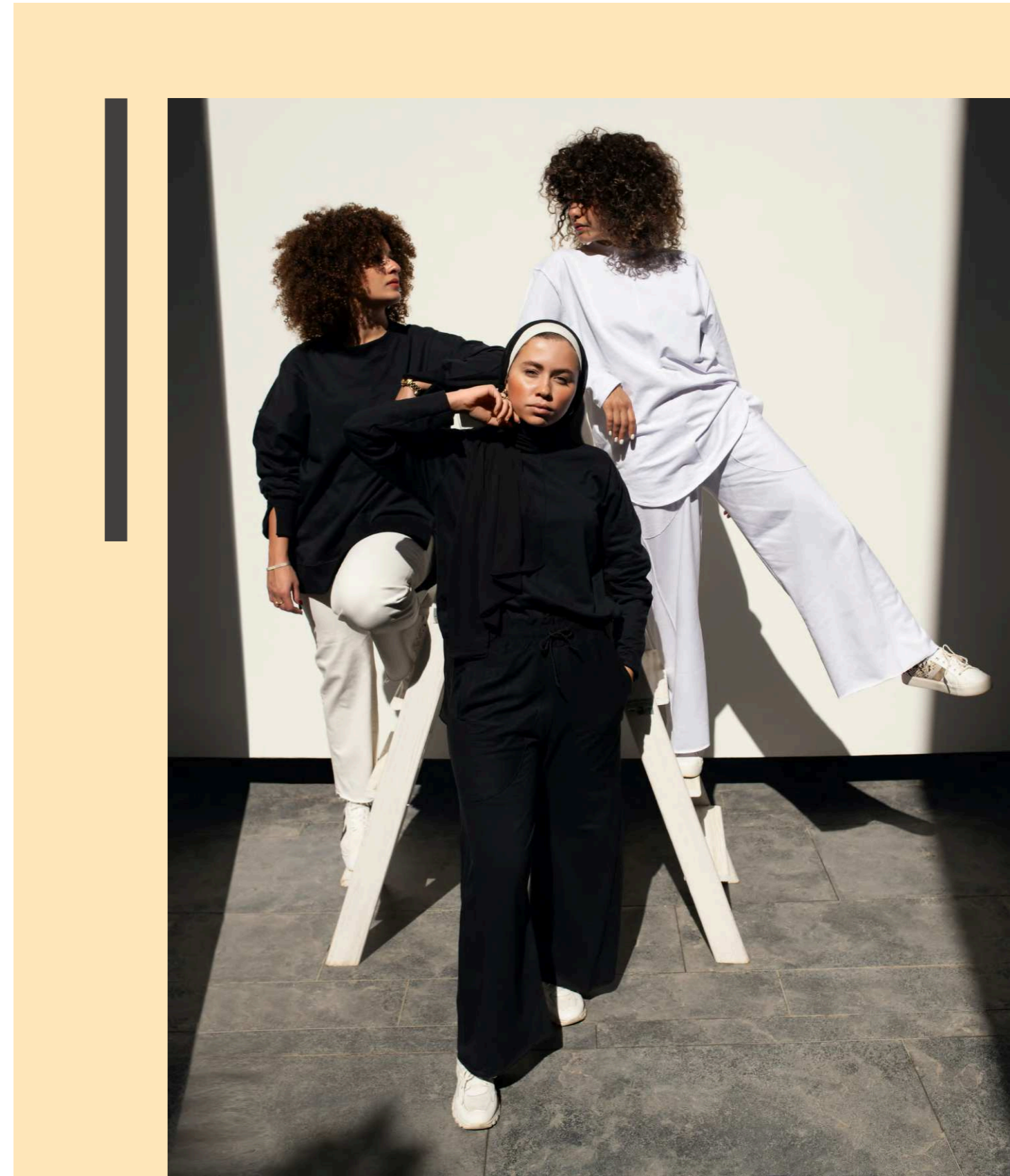
Across all of those avenues, there is a gigantic requirement for product data, product photography, and 3D assets – all properly organised, and all made accessible in an interoperable format. Managing this requirement is one of the foremost challenges facing brands in 2021, and is also likely to be one of the primary catalysts for digitisation and automation as businesses continue to expand their digital capabilities.

For a brand of medium enterprise scale and above, products created in PLM and connected design, development, and production solutions are likely to need to be exported to the brand's own direct to consumer platform, to a range of different eTail partners that may use Shopify or other competing platforms, and

potentially to one or more third party marketplaces. All of these touchpoints will require multiple images per colourway, exhaustive product, construction, composition, and sustainability details, and more – creating a scenario where sheer volume makes automation a necessity, and mandating the use of PIM and DAM functionality that either forms a component of PLM, or is integrated to the brand's PLM solution.

And while 3D may dominate asset creation at the moment, physical product photography is likely set to resume in the latter half of 2021, increasing the need for automated attribute tagging platforms – of which several already exist, making use of our second cornerstone technology: machine learning.

Artificial Intelligence / Machine Learning

If digital selling is the next major battleground, then intelligent platforms that help brands make informed decisions on what to sell are likely to become essential weapons for the organisations that have not already adopted them.

The terms artificial intelligence (AI) and machine learning (ML) have a chequered history in a range of industries – fashion and retail included. Those labels have been applied to many use cases where they were not justified, and technology decision-makers are rightly sceptical of new solutions that brand themselves as being AI-driven.

Despite that healthy pessimism, though, AI and ML are being successfully deployed at multiple stages of the value chain, and their impact will be felt in a more significant way very soon.

In trend analysis, services like WGSN and Retviews (now a Lectra company) are quietly shifting to a synthesis of AI-gathered research and human interpretation, while pure data-scraping and modelling services like EDITED and Omnilytics are automating that same process. And beyond the product level, platforms such as Placer are mining the movement of people at an extremely granular level to provide totally novel insights into the performance of bricks and mortar stores.

The above platforms are already being used to inform design decisions, but ML is also set to become a valuable design assistant, with generative models that can automate the design (and even potentially the technical development) of iterative products, new colourways and derivative styles, and more. Most notably, retail business Stitch Fix has expanded its use of AI and ML beyond the initial application of making predictive style recommendations for shoppers, and into the role of design assistants.

At the same time, ML is operating invisibly behind the curtains of most major eCommerce platforms – not just for product search, using platforms like Constructor – but also for real-time A/B testing of website experiences, and for enhanced, context-aware product recommendations.

And beyond these applications, machine learning has established a prominent place for itself in consumer engagement – from applications like Modiface, which power cosmetic try-on apps, to style assistants and chatbots that are designed to help shoppers pare down a complete inventory into a list of more manageable options.

2D CAD

Like AI and machine learning, 2D CAD is an all-encompassing label that captures multiple different technologies – from flat inspiration vector sketches to technical, to-scale garment drawings on meticulously organised artboards, and from knitting functionality to texture mapping, and store designs with fixtures and fittings.

The Adobe Creative Suite is the most obvious manifestation of 2D CAD in the apparel and footwear industries, since it has become firmly established as the de facto standard for vector artwork, but it is not the only solution in its niche. Competitors like Pointcarre (wovens & prints) and Shima Seiki (knitwear) are smaller forces, but niche players nonetheless.

Even in the age of 3D, the majority of creative designs still begin life in 2D, which places great emphasis on the importance of integrations to capture these initial inspirations, ideas, and concepts. And as design advances, the odds are good that any given brand has made greater progress towards having robust libraries of components, colour palettes, materials, avatar sizes and

so on in 2D than they have in 3D, and one of the primary questions facing creative and technical design teams is whether 2D CAD has a permanent place in the future, or whether 3D simulation linked to 2D technical patterns is feasible as a workflow in its own right.

2D CAM

Under the umbrella of 2D CAM sit the range of different software-to-hardware platforms and solutions that translate 2D concepts into prototypes and, eventually, into finished products.

Historically the global leaders in 2D CAM (computer aided manufacture) have been Gerber Technology and Lectra, whose competition with one another drove much of the innovation in technical patternmaking, material yield optimisation, nesting, spreading, NC cutting, and other manufacturing hardware. As of May 2021, however, Lectra will complete its acquisition of Gerber Technology, putting an incredibly broad selection of manufacturing hardware and software under one roof, and consolidating a lot of the power in the onramp from technical development to production – at least in apparel – under the one name of Lectra.

As brands across every product category begin to focus their attention on the intricacies of manufacturing, though, solutions outside that dominant group are likely to grow, including companies like Tukatech, Richpeace and Crea – as well as the continued importance placed on more focused applications and hardware from suppliers such as Shima Seiki.

Merchandise Planning

In the current retail environment, where production happens closer to demand than ever before, merchandise planning has assumed a heightened importance. From initial design to channel allocation and inventory distribution, merchandise planning as a process captures the essence of both direct-to-consumer retail and wholesale: creating products that either respond to what the market wants, or create that desire themselves.

Merchandise planning – along with financial planning, assortment planning, material & colour planning, and other methods of approaching the decision of what to bring to market – has historically been covered in a shallow way within PLM, leaving two planning tools to corner the market in deeper, more analytical, predictive planning: Oracle and Aptos.

While these two solutions remain dominant, there is crossover between the disciplines of merchandising planning, trend analysis, and retail planning, and solutions like Nextail and EDITED that are now considered to be inputs, outputs, and influences over the planning process. And this is before we consider the likely emergence of a new generation of machine learning-driven planning tools.

Material Sourcing & Compliance Testing

One of the last remaining fully analogue processes, material sourcing has undergone rapid digitisation in the last few years. Today, there are numerous digital materials platforms that operate scanning as a service for producers and mills, and then present large, pre-digitised collections to brands that have been reliant on

attending material trade fairs and receiving physical swatch books until recently.

Among the companies currently vying for market share in the digital material sourcing space are Swatchbook, Material Exchange, Frontier, SwatchOn, and Substance Source.

Each of these approaches the problem differently. Swatchbook operates as a home for organising, visualising and sourcing digital materials; Material Exchange aims to simplify complex relationships between footwear and apparel brands and material suppliers; SwatchOn is an online fabric marketplace with more than 200,000 fabrics with a strong emphasis on sourcing physical fabrics rather than 3D-ready materials, and with far smaller MOQs; the Frontier platform is intended to democratise digital material creation, with strong support for suppliers, and AI-driven intelligent discovery for brand users.

Then there is of course the Adobe Substance Suite, including Painter (allowing users to paint and texture 3D models), Source (a premium library of 3D materials with parameters that can be adjusted on the fly), Alchemist (designed for the authoring of 3D materials through procedural generation), and Designer (allowing users to create their own realistic 3D materials through

knowledge of knitting and weaving, as well as the platform's own logic engine).

While these platforms are focused mainly on non-technical apparel creation, all of them are in the process of adding detailed sustainability credentials to their material archives to assign each an index score, and similar efforts are underway to include testing results and certification for the suitability of a given material for a particular product type.

Beyond these new digital material platforms, mills are also scanning and building their own internal libraries, sharing their latest designs with existing clients, and at the same time inviting customer feedback to co-design new material developments.

Material Scanning

Every material sourcing platform is populated with materials that have either been authored (as is the case with many of Substance Source's library of bespoke parametric materials) or, in many cases, scanned from a swatch or larger length of physical material.

The process of scanning those materials can be incredibly technical, in instances where high fidelity end results are necessary, or quicker, where only a passing resemblance is needed. Companies like Vizoo and X-Rite produce technical scanning hardware, with X-Rite in particular catering to the high end of the market – although X-Rite has recently developed a handheld scanner that should fall somewhere in between the high-fidelity results of its TAC7 scanner and a simple smartphone scan.

At the same time, though, no brand or supplier should ignore the potential for AI and machine learning platforms to take relatively low-fidelity scans and to transform them into digital materials that are suitable for much more demanding applications. Here is where solutions like Unity's ArtEngine, which handles up-resing, mutation, seam removal and other automated tasks, could potentially change the conversation considerably – potentially removing the requirement for costly digitisation hardware from all but the most technical applications of digital materials.

And we should also mention the completely different approach to scanning that SO REAL have taken, deploying medical grade X-Ray CT scanners for the digitisation of entire products – including their internal composition – to automate the production of truly authentic digital twins, down to the micro scale.

Body Scanning & Body Data

Body scanning is an over-subscribed space. We have long since lost count of the number of businesses that are purporting to be offering "revolutionary" body scanning applications that use a smartphone camera, a front and a profile photo, and synthesise a fairly accurate 3D model of the user's body from these. These solutions are, in their purely functional sense, interchangeable, and consumers have shown themselves to be hesitant to embrace them without additional justification in the form of improved fit, smart product recommendations, and other incentives.

Where the real value of this process lies is in the body data it generates, which can be aggregated, anonymised, and used by a brand to iteratively transform the way they design products with a real target consumer in mind, the way they create experiential retail, and the impact that returns have on their business.

Companies that have made bigger strides towards realising this vision for the use of body data to create a

virtuous loop include 3DLOOK – perhaps the largest player in this field – and 3D-A-PORTER, Alvanon, Avalution and Vitronic, which is in the process of turning its historical dress forms and segmented digital avatar business into a going concern for more tailored digital avatars.

3D Design, Simulation, and Visualisation

Under the heading of "digital product creation" (DPC) 3D design, simulation, and visualisation has become one of the retail, footwear, and apparel industry's most sought-after technologies. The most common names in 3D are, of course, Browzwear, CLO, and Optitex, but a wide range of footwear specific solutions (including Rhino, RomansCAD, Foundry's Modo and others) and other category-specific options also exist – with varying degrees of emphasis on engineering accuracy or aesthetic realism.

Sticking to design and development for the moment, there are also at least two 3D solutions that have thus far been concentrated on selling to businesses in Asia (China and South Korea respectively), Style3D and Z-Emotion. Both of these, and no doubt others, are now forging a path into the rest-of-world market.

Beyond design and development, 3D is seeing real uptake in downstream applications, including virtual photography (through offline renderers and through staging platforms such as Adobe Dimension) augmented reality experiences, embedded 3D objects for eCommerce and much more.

3D Asset Management

As 3D and digital product creation strategies extend further beyond the walls of brand HQ and close supply chain partners, a crisis is looming in 3D-specific digital asset management.

The files generated by Browzwear, CLO, Optitex and other design and simulation solutions that emphasise pattern accuracy are large – often in the order of 300mb and upwards – and have limited interoperability between different AR standards for social media (Snapchat, Google, Facebook / Instagram etc.). They also contain a great deal of information that is redundant for downstream applications – both in terms of product metadata, but also in the sense of raw geometric detail.

For brands wishing to adopt a "create once and reuse" approach to 3D – which is, in our opinion, the right approach – those limitations are going to become significant obstacles. At least one 3D asset management and content management platform – VNTANA – proposes to fix this problem through lossless or lossy compression, geometric decimation, omni-channel compatibility, and other optimisations and automations.

We believe VNTANA has already been integrated to one of the leading PLM platforms, and that synergy could potentially offer a significant leg-up for any brand looking to use 3D assets more broadly.

Digital Avatars & Digital Fashion

Tied to the rise in the use of 3D assets for downstream applications is the question of whether those assets should be sold as products in their own right, divorced from the physical garment, shoe, or accessory they represent. This area, which is dubbed either digital fashion or virtual fashion, is currently seeing a flurry of interest, but at this time a lot of different practical, technical, and commercial questions remain unanswered.

Integration between 3D design tools for apparel and footwear, and popular game engines such as Unreal Engine and Unity could offer a streamlined route to

realising the potential of digital-only sales, and our team is in active talks with every party in this conversation to help steer research & development to support real-life use cases.

One of those engines, Unreal, is also home to the MetaHuman Creator, which is a user-friendly tool that allows anyone with even cursory experience of game logic to create believable-looking digital human-models that can be used for both high-fidelity virtual photography and mobile-native eCommerce and AR experiences, effectively democratising the entire modelling industry. At the time of writing there is no established workflow to take a garment from Browzwear, CLO, or Optitex – or a shoe from RomansCAD, Rhino or another footwear solution – and dress those MetaHumans, and neither is there sufficient body data and body type / sizing configurability to make these MetaHumans viable as digital fit models, but both of those are items on the developers' roadmaps.

This is not an area that any brand should necessarily be focusing investment today, but it is certainly one to watch for the near future.

Colour Management

Many businesses already operate colour management systems – the most notable being the PantoneLIVE platform, a centralized repository where colours and operating procedures are securely stored. Similarly, many PLM solutions – some in much greater detail than others – offer some level of colour management in software and / or hardware, and lab dip processing and approvals that are often managed this way. We feel that it is important to callout that very few PLM vendors have integrations to PantoneLIVE, which in many ways follows the model of Adobe Illustrator in that it is the fashion sector's preferred standard for colour!

There is also at least one dedicated Colour Lifecycle Management solution that exists independently of PLM (sold by the PLM vendor DeSL), which aims to make the science of colour more universally understood, and more accessible.

For a business of sufficient size, there is considerable potential for improvement in the management of colour in brand-to-supplier relationships – especially where the digital colour management and approval process is concerned.

3D Printing / Additive Manufacturing

Until recently, 3D printing has been a couturier's technology, deployed for the purposes of bringing to life artistic creations that either were not possible using traditional manufacturing methods and materials, or as a way of pursuing new integrations between embedded technology and apparel. Examples of this artistic application of additive manufacturing include collections by Iris Van Herpen, social art projects by Anouk Wiprecht, and collections by Danit Peleg.

In almost all of these cases, the 3D printing used polymers and plastics, but similar approaches have also been taken with fibres (included electrostatic binding), knitted constructions, and innovative sole designs for footwear that would not have been easy or possible to realise without those technologies.

3D printing, however, does not need to be confined to those material types, and different suppliers have had success in printing buttons, zipper pullers, and other furniture using metallic substances, upcycled materials, metals, and other sources.

Digital Material Printing

Material sourcing is currently one of the most problematic areas of apparel and footwear production; supply chains remain constrained by the pandemic, and need to create prototypes and samples more quickly than ever.

For fabrics, brands and retailers that either manage or very closely collaborate with their production facilities are turning to digital printing as a way of producing fabrics in the right colours and patterns on-demand. This is distinct from direct to garment (DTG) printing, which is focused on applying artwork and prints to already-produced garments, and direct to fabric (DTF) printing is concentrated on the creation of lengths of fabrics (far less than the MOQs that would be typical of even the most carefully-negotiated supplier relationship) that can be used almost instantly in prototype and sample production, or even in bulk manufacturing today.

Leading digital printing company Kornit recently partnered with Gerber Technology to install an Allegro direct to fabric printer as part of Gerber's "microfactory" proof of concept, with the output of the printer being synchronised directly to the input of the cutting machine, creating a seamless workflow from eCommerce to digital print, to cut, sew, and finish – all in one room.

This may be an extreme example, but similar "nodes" in the network of on-demand production are already springing up throughout the USA and Europe, and these rely on either intelligent, hyper-reactive material sourcing and allocation strategies, or alternative methods of actually producing their materials in-house.

Digital Dyeing

Similarly, those brands and retailers who operate small production runs (or are planning to in the future) will sooner or later encounter the potential of dyed-to-match (DTM) digital thread dyeing. Next to material sourcing, thread is one of the foremost contributors to delays in production, as well as being a major source of overstock, waste, and environmental damage.

Digital thread dyeing proposes a closed-loop system that allows yarns and threads to be dyed to any digital colour reference on demand, in any length, in a matter of minutes. This opens the door to both rapid prototyping and the potential for radical in-store customisation of apparel and footwear, since thread can be dyed with gradients to create truly unique colour combinations.

At the time of writing, Twine Solutions is ahead of the pack in this area, with initial proof of concept work complete and now extending their R&D into production level machinery, with products landing on store shelves that incorporate digitally-dyed thread.

Synthetic Costing

Synthetic costing refers to the ability for a (trained) designer, technical designer, industrial engineer, or a member of the sourcing team to calculate the likely cost of a product – across materials and labour – to a finite degree of accuracy when compared to real-life labour calculations. Increasingly, creative designers are being asked to assess the cost impact of their decisions, but are finding their ability to do so limited by a lack of insight into the operations breakdown cost of a particular product.

Many solutions – especially when multiple platforms are integrated – can provide those insights into the cost of materials, but the cost of labour is much harder to

quantify without an accepted industry standard for factory operations. Such a standard does exist, and is accredited by the International Labour Organisation, as well as being widely used as the single accepted standard for quantifying human labour in apparel factories.

None of the leading PLM vendors have yet completed a deep integration between their platform and GSD, and at present no 3D vendor has incorporated their seam types and lengths into standard minute values within their 3D simulations, but with these pieces in place it would be possible (indeed fairly easy) for designers to instantly know the true cost impact of their design styling decisions, as well as providing a foundation for synthetic factory planning and collaboration.

The same methods can also be delivered by PLM vendors, completing similar integrations to SATRA TimeLine, that is used to provide synthetic costing of footwear designs and production.

Factory Planning & Supply Chain Transparency

In addition to wanting to know as much as possible about the cost of their products, brands who work with either strategic or contract manufacturing partners are also demanding greater insight than ever into the inner workings of their supply chains. Downstream this trend is being driven by shoppers' desires to know more about where their products are made, by whom, and from what materials. Upstream the emphasis is on having visibility into factory capacity, machinery, order confirmation, skills matrix and more – to ensure a smooth production flow.

Unifying these two strands is one of the tools that the retail, footwear and apparel industry has to approach the vision for true supply chain transparency and a more sustainable model of production – one based on actual insights and concrete plans, rather than assumptions and mandatory overtime.

Supplier Collaboration & Co-Creation

In line with the requirements of supply chain transparency and evidence-based factory capacity and commitment planning, closer collaboration with suppliers is a key target for any brand or retailer wishing to better understand their supply chains and to leverage the design, development, and production expertise that their suppliers have built. This is redefining the traditional brand-to-supplier relationship from one of uni-directional order placement and fulfilment to one of mutual co-creation.

To achieve this, it's essential that strategic suppliers are giving access to a single version of the facts as they pertain to product data, technical specifications, 3D assets and more. Typically this is managed with PLM being extended – through secure licenses rather than disconnected vendor portals – to supply chain users, but other methods of collaboration also exist, and may be used at different stages of a product's lifecycle.

Real-Time Visibility

Beyond factory planning and co-creation lies the world of truly connected manufacturing, with hardware-level connectivity and Internet of Things devices driving dashboards and data aggregation tools providing real-time insights into production as it happens, allowing factories and their brand partners to react instantly.

The same level of insight (provided by companies like ResQ) is also powering a new level of proactive quality management.

The next few years will usher in a chapter of interoperability linking both the downstream and upstream processes. We hope that these insights into our digital future will allow you to strategise your digital journey...

NEXT STEPS FOR PLM CUSTOMERS

It's amazing to think that only 14 months ago we could research the PLM market landscape and shortlist a small group of potential vendors that could then be invited to visit our premises and present their PLM product offerings. Fast forward one year and that feels like an absurd request. Just like retailers and brands have had to rethink their models around virtual team meetings and advancing to virtual sampling, vendors of PLM systems have had to rethink about how they engage with potential customers and how they can implement PLM solutions remotely.

Today, multi-tenancy PLM solutions are certainly one of the architected platforms that can serve up 'PLM on demand', even as a presentation to potential buyers; vendors can now serve up solution demos and even complete implementations. During the pandemic, we have been aware of multiple implementations that have taken place and in several cases we have been involved from an auditing perspective, and these implementations have continued on a positive path towards realising benefits.

If there is one, clear message that this pandemic has provided then it must be around sustainability and the environmental impact brought about by fashion across the supply chain. As customers of next generation PLM solutions, I feel that it is critical that PLM is used to help reduce the environmental impact of fashion on the planet. To this end, when it comes to implementing a PLM solution, project teams must consider sustainability across the entire value chain and should put sustainability modules centre-front in their projects. In our opinion the industry has been slow in taking sustainability seriously. Retailers and brands have taken some basic steps, mainly around the materials that are used to produce products,

for example organic cottons, Better Cotton, recycled polyesters, Lyocell and other natural fibres.

It's time that we moved the sustainability agenda forward when it comes to PLM. We need to move beyond the selection of sustainable materials and into how we process our products; the bill of material needs to be extended to include sustainability scoring on materials, trims, components, yarns and threads. Colourways and the method of dyeing materials is also a critical element of the sustainability lifecycle, and new digital printing methods should be carefully considered as part of a retailer's and brand's new way of operating. And it's not just the bill of materials that matters when it comes to the subject of sustainability - it also includes the bill of labour. If, as a brand or retailer, you are serious about sustainability, then you must play your part in calculating a fair bill of labour that leads to a fair living wage for those machinists and operators working to supply your finished products. To arrive at a fair FOB price retailers and brands should collaborate with their supplier partners to ensure both parties are working on factual, scientific costings.

Our final piece of advice for customers of PLM is to ensure that when starting out on this journey you should scope, design and implement across the entire value-chain. Don't make the mistake of starting your PLM project by implementing in your headquarters and across your departments, without giving careful thought and consideration to how your vendor partners will use and benefit from this PLM implementation. Over and over, we've witnessed retailers and brands selecting a PLM solution, implementing it in their headquarters and then stalling, sometimes for years, before the PLM solution is

eventually rolled out to supplier partners. This is counter-productive and can lead to unforeseen challenges later in the project. Getting early buy-in from everybody involved in a product's lifecycle, from early trend analysis to the eventual sale to the consumer, can only be a good thing.

Over the past 12 months we, at WhichPLM, have been working diligently on a new PLM Project Pack that, just like other virtual services, has been designed to allow new prospects of PLM to obtain advisory services that would otherwise be shared during face-to-face meetings. We have taken great pains to document all of the critical steps in the process of researching, evaluating and planning for your PLM journey, including critically reducing associated risks that are sadly too common in a PLM project.

NEXT STEPS FOR PLM VENDORS

It's been over 14 months since the start of the pandemic and who would have imagined that the world would still be in some form of 'lockdown'. Some countries are speeding through vaccinations, whilst others, like India, are suffering and will continue to do so for months to come.

When you analyse the fashion marketplace you can see that what we've been predicting for the last few years - a reduction in demand levels and further complexity of the SKUs (stock keeping unit) - has indeed become today's reality and, in our opinion, will continue along this trajectory.

We have witnessed an explosion in the use of virtual sampling, some of which is linked to the downstream sampling and rendering of high-fidelity imagery. One use case for 3D virtual design and development is related to upstream processes, with fidelity products supporting e-commerce selling. PLM's value in helping to streamline the 3D lifecycle process is still very limited and is far from delivering meaningful benefits. Having spoken to retailers and brands that have been using PLM and 3D systems for many years the reality is, unfortunately, still some way off delivering real quantifiable benefits that can be directly linked to the integration of PLM and 3D solutions. We're not suggesting for one minute that there are not benefits to be had from integrating PLM to 3D solutions, but the reality is that the benefits are still very small. It's time to rethink the use cases and avoid rushing into developing integrations that offer little value to retailers, brands, and users of both solutions and their value chain partners.

When it comes to integrating PLM to 3D digital solutions, then we would suggest that it's time to step back and really look at the digital processes. Re-evaluate the benefits of integrating each of these expanding platforms that, operating together, create virtual processes for both downstream and upstream use cases - which can be very different in terms of how and what will be used to create the desired outputs. Keep in mind that the expanding solution stack would include digital scanning of bodies, feet, materials and components. Depending upon the use case, these data assets could be large in file size. In this case it is highly unlikely that these digital assets would be made easily available from a PLM library and would most likely come from a DAM (digital asset management) solution. If the 3D use case is for downstream purposes and will require high fidelity image rendering then, following 3D design and engineering, the output would move into a rendering engine. These are just examples of the complexities related to the use of 3D and how it integrates to PLM; you can see that it's extremely complex and requires careful thought and consideration to expose the true value of these integrations.

Last year we stated that "technology expenditure was not guaranteed": a sensible assessment at the time. One year later and we can say that we've experienced massive increases in technology spending; in some cases we've seen the equivalent of five years' worth of spending in a single year. Indeed, this year's PLM sales (by customer count) are at the highest level we have ever seen. And we've experienced an explosive demand for 3D technology. Further acceleration in digital spend has gone on material platforms. Mills have invested in their own scanning capabilities and are now coming to market with their own material libraries.

We have also seen greater use of digital printing linked to sampling and small run productions. One of the leading digital printing companies has created an e-commerce marketplace that networks its hardware and software to allow retailers and brands to locate printers that can service regional or in-country demand for direct to garment or direct to roll printing services. Having spoken to brands and retailers the feedback relating to the use of digital printing on bulk production is still concerning, due to the high cost of consumables versus traditional material dyeing methods.

Finally, PLM vendors will need to stay on top of the game when it comes to reducing the heavy cost of implementing a PLM solution. The days of implementations taking hundreds of service days to complete are well and truly gone! Implementations will need to be made easier just like the simplification of software. Virtual implementations should be considered the new norm. Today's PLM customers operate in a world full of apps that work out of the box, and there is little or no appetite for long, drawn-out implementations. We can also testify, based on this year's PLM sales analysis, that the lower tiers (3, 4 and 5) have seen the area of largest growth. And we can also see that the mega brands and retailers are continuing to upgrade their technology platforms and ecosystems; some upgrading their PLM systems whilst others opt for new, less complex and challenging solutions. It's worth noting that, at the higher tier levels, the degree of complexity is many, many times greater than that of the lower tier requirements and this is an area that will demand greater integration and openness to all data residing within these PLM solutions. Those vendors that target or service the higher tiers need to up their games if they want to continue to stay in the top flight of tier 0s, 1s and 2s.
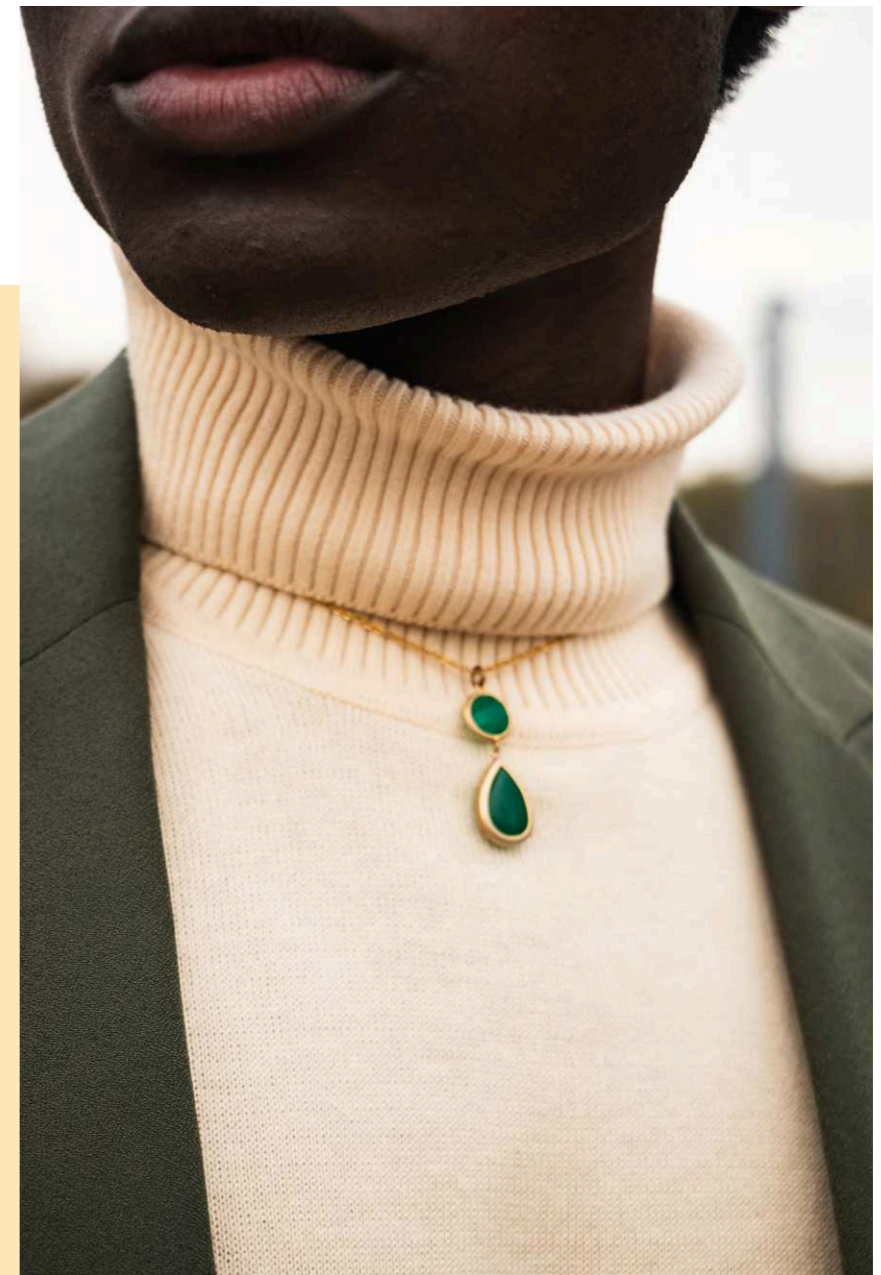
NEXT STEPS FOR PLM CONSULTANTS

Last year, when considering the future role of implementation consultants in our 2020 Buyer's Guide, we started by saying 'in light of the current crises'. Today we start our final piece of this year's Buyer Guide, by stating that we can see the light. But it's not at the end of the tunnel, rather within a new tunnel that is destined to become our new way of doing business.

This new norm has brought with it new technologies and processes - the likes of 3D virtual design and development, body scanning data, digital materials platforms, digital printing and dyeing technologies, digital colour approvals, real-time supplier data inputs and outputs, digital tools that support sustainability and fair labour. Retailers and brands continue to look at their analogue processes and search for new process introductions that can turn the analogue into digital. This is a short list of examples of the broader quest to digitise our value chains. Taking this topic into consideration, consultants will need to spend considerable time in first getting to know, and secondly gaining a good degree of understanding and practising how these solutions can become part of a broader, more in-depth PLM implementation project.

As stated in previous years, Tiers 0 and 1 still utilise the lion's share of professional services; going forward, unless the implementation teams expand on the broader solution stack knowledge, then brands and retailers will look outside of the core PLM implementation team and will utilise third-party expertise linked to specific solutions.

The pandemic has necessitated the need for consultants to undertake virtual implementations. Winding time back just two years ago it would be reasonable for any consultant to say no to carrying out video conference interviews to support a PLM implementation. Over the last 14 months we have been notified of many implementations that have been delivered by virtual means and have gone on to be successful projects, all be it that they are still in the early phases of rolling out the full set of modules that can typically be found in a PLM platform.

We would suggest that this model becomes the new norm, even if it becomes a hybrid implementation that is mixed with face-to-face sessions and virtual ones. What is required is that consultants develop improved online documentation and supporting knowledge base to improve each of the session's delivery outcomes.

Today's consultants and PLM implementation experts need to increase their knowledge and expertise linked to the growing number of technology solutions that will impact and/or use the outputs coming from PLM. Rather than focusing on how to implement the PLM solution these teams will need to support process owners in developing expert-led best-practice processes. PLM implementation teams will need to gain a greater understanding of the problems and how these problems can be turned into opportunities, based upon delivering the *how*.

The implementation teams that want to survive will need to become process experts across the entire chain from trend analysis, using artificial intelligence and machine learning, to understanding the intricate details and use cases related to 2D design (Adobe Suite), 3D design and development, digital manufacturing techniques and data transparency. With the introduction of low-code and no-code technologies, this new generation of process experts will become critical in delivering speed and value to market.

As part of WhichPLM's advisory services we have been called in to audit PLM implementations that in some cases are faulted and have even had to stop, or in other cases they have been slow to get off the ground. One of the current findings on each of these PLM implementations is the lack of detailed knowledge of the processes and solutions that are required to extend into or from PLM. The fact is that often implementers do not know what they do not know! It's time to recognise the facts and work towards gaining the additional knowledge that is required for a modern-day PLM platform implementation that will be related and integrated to many other technical ecosystems.

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 Buyer's Guide, readers will find those industry acronyms and common terms used or alluded to by both our in-house team and by vendors and consultants who appear in our listings. While we have made every attempt to define these where they first occur, the nature of this Buyer's Guide means that not every reader will approach its content in a linear fashion, cover to cover.

In order to avoid confusion and provide absolute clarity for all common acronyms and phraseology, this glossary collects concrete definitions from PLM experts of what we consider to be the most useful, contested, and popular PLM industry terms, arranged in alphabetical order.

2020/21 = Each WhichPLM publication represents a retrospective look at the financial year that has gone before it, this Guide included. Our 2020 Buyer's Guide, released in May 2020, examined trends, market analysis, topics, events, end user feedback and more – all originating from or pertaining to the fiscal year 2019/20, while this PLM Buyer's Guide contains similar content, but from the financial year 2020/21. 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 "2020/21" in these pages, we mean the period from 1st April 2020 to 31st March 2021 rather than both full calendar years.

CAD = An acronym for Computer Aided Design, which collectively refers to any software platform - including peripherals and hardware accessories - that enables a designer to work digitally rather than on paper, to agreed upon and replicable standards of measurement.

Cloud = A catch-all term for any application, deployment, or strategy that involves distributed processing or storage. Historically, these were split into Software as a Service (SaaS), Managed Services, and a host of other labels, but while the differences between these approaches remain, WhichPLM considers the most important distinction today to be between whether a solution is hosted on-site (i.e. on hardware owned and maintained by the customer) or off-site, in data centres owned and maintained by the vendor. While this is not always the case, a cloud deployment is often tied to a subscription pricing model, rather than the traditional upfront license / ongoing maintenance model.

CPG & CPG Crossover = Short for Consumer Packaged Goods, CPG is an extremely broad term that, along with Retail, Footwear and Apparel (RFA) captures almost every product category for retail goods, besides food and beverage. Starting from last year, our Market Analysis contains customers that fall under the umbrella of CPG Crossover. Coined by WhichPLM, this category is designed to capture those PLM customers who fall somewhere in between the RFA market that WhichPLM has covered for close to a decade, and more traditional consumer products. Broadly speaking, crossover products will still incorporate soft materials and textiles or employ similar processes to apparel.

By way of example, toys, pet care products in the soft category, home and office furnishings, eyewear, watches, and jewellery would be considered CPG Crossover product categories, and therefore brands and retailers who work in these categories are, as of this Buyer's Guide, considered valid for inclusion in PLM vendor's customer lists, and are covered by our Market Analysis. And while this list is by no means exhaustive, pharmaceuticals, food and beverage, beauty and cosmetics, white goods, and other similar products are considered to be traditional CPG, and do not fall into the CPG Crossover category. These products (and the brands and retailers that sell them) are not, therefore, included in either our Market Analysis, or in vendor customer lists.

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. Our usage of this acronym has decreased over time, however, and as you will notice as you read this publication, we now prefer to use the catch-all term "digital solutions" to refer to technologies that support the goal of digital transformation outside the PLM purview of design, development, and sourcing.

ERP = Enterprise Resource Planning is often cited as being one of two large business systems that sit at the heart of a modern retail or brand environment – the other being PLM itself. ERP is more financially and logistically-oriented than PLM, and although this is not an exhaustive definition, the simplest method of delineating the two is to remember that PLM handles all product development tasks, passing its information on to ERP at the point that a product becomes a reality and enters the ordering, shipping, allocation, and selling process.

External user = We define an external user as an active, individual license situated outside the parent company – typically within the offices of one of its geographically distant supply chain partners. These users will likely have restricted access to the PLM solution, so the functionality of an external license

should not be automatically considered equivalent to an internal license. Prospective customers should also note that vendors' approaches to these licenses differ dramatically: some provide free-of-charge external user licenses; some assign a license fee; some choose not to distinguish between these and internal users; and still others offer a stripped-down "vendor portal" instead, and do not recognise the term "external user" at all.

Internal user = We define an internal user as an active, individual license situated within the confines of the parent company – either its own offices, satellite locations, or international representatives.

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 or new-name sale = Readers will find this phrase throughout our Vendor and Consultant Profiles, as well as our Market Analysis section. Where it is used, we are referring to a business that has, in the period we define as 2019/20, signed a deal with – in the case of the PLM Vendor Profiles - an apparel PLM vendor to acquire that vendor's PLM solution ready for implementation across one or more brands, and with any number of licensed users. Customers who adopted a different solution from the same vendor without PLM – CAD, for instance – do not fall within this definition, and neither do customers of ERP, warehouse management and so on, unless they bought and adopted those solutions concurrently and in addition to PLM. For the reasons stipulated in its definition, PDM does not qualify as PLM for the purposes of this Buyer's Guide, and customers of PDM (and CPM) are not included in overall figures or statistics for 2019/20, falling well outside the scope of this publication.

PDM = An acronym that saw widespread use prior to the year 2000, when Product Data Management solutions were considered to be the best possible tools available to retailers, brands and manufacturers seeking to modernise their product development environments. As the name suggests, these systems were focused on the production, cataloguing and communication of product data – typically in the form of a PDF "tech pack". Although these solutions were later web-enabled, refined and enhanced as the industry progressed, eventually more fully-featured, web-based solutions that handled a greater variety of processes emerged, and PLM replaced PDM in virtually all of the territories WhichPLM covers. No major vendor focuses on selling PDM systems today, and the majority that previously did have established clear transitional programmes to move their legacy PDM customers to their modern PLM platform.

PLM = An acronym used in place of its longhand version, Product Lifecycle Management. Considered to have superseded CPM in approximately 2003, PLM is a suite of tools (often collectively called a "platform") that enables retailers, brands and manufacturers to optimise their product development processes, consolidate their data, and create a centralised, contemporaneous, collaborative backbone for the people, products and processes that together make up the lifeblood of their business. Although the acronym itself originated in the aerospace and automotive industries, today there are many vendors who provide proven PLM solutions to the retail, footwear and apparel industry, either as their sole focus, or as one vertical amongst many.

Resourcing = Where we refer to a given vendor's "resourcing", or where (such as in this publication's Vendor Profiles section) we have requested statistics to support a vendor's "resources by region", we are referring to individuals in the employ of the vendor who work in the area of PLM for retail, footwear and apparel. This does not typically include third party implementation or development partners, but these may fall under the umbrella of "resources" where an extremely close relationship has been established between the vendor and its partners over the course of many years. It is clearly desirable that these individuals have direct RFA industry experience in addition to deep product knowledge, but sadly this is not always the case, and in order to draw a distinction between pure numbers and what we consider to be "real" apparel industry staff, we use the phrase "expert resources".

RFA = A common industry acronym, RFA stands for retail, footwear and apparel, and is widely-used shorthand for the fashion, accessories, jewellery, footwear, toys, automotive and home furnishings upholstery / textiles industries. Following on from last year's Buyer's Guide, both RFA and CPG Crossover market segments are included in both our Market Analysis and PLM Vendor Listings.

ROI = Return on Investment refers to the main metric by which implementations of any enterprise system is typically judged: financial performance relative to the required investment. Despite some reductions in the total cost of ownership of PLM, the expenditure involved in licensing, implementing, and maintaining a modern solution remains significant. As a result, PLM projects should only be undertaken when a clear ROI business case has been assembled – an objective analysis of how soon and in what form the chosen solution can be expected to deliver a financial return greater than the cost of obtaining it.

Seat = Essentially interchangeable with "license", seat refers to an active, maintained individual software license – i.e. a human being occupying a seat at a desk, performing a job role, and actively using the software in question.

UI / UX = These two acronyms are not – despite common misuse – interchangeable. UI refers to the user interface of a given piece of software – the actual design and interactivity components through which the user experiences raw functionality. UX, on the other hand, is a farther-reaching term, used to denote the broader experience of actually working with that software. UX will include UI, but will also factor in other aspects like speed, social collaboration, click rates, the flow of information and more.

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