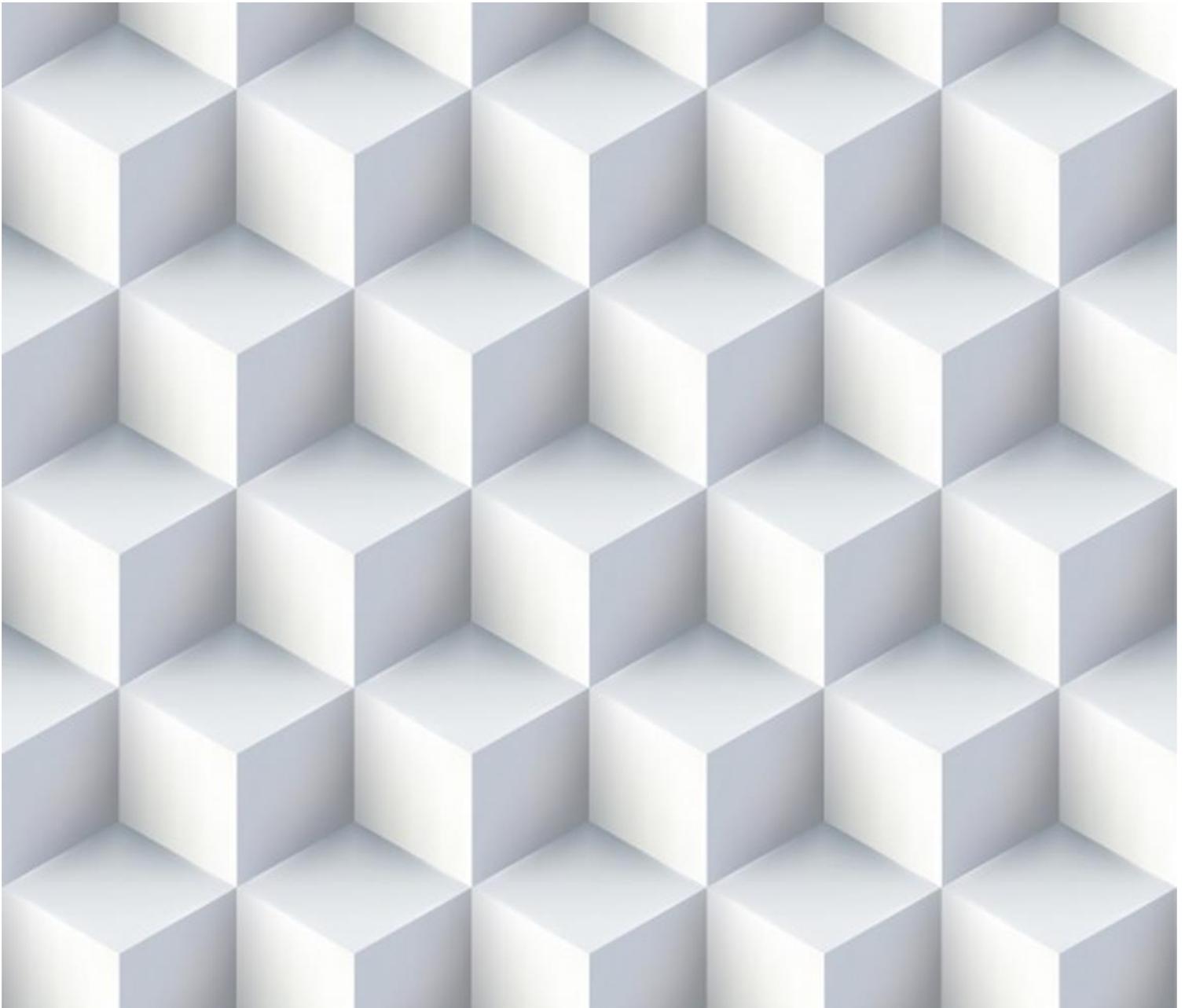

Adoption of 3D Applications in the Apparel and Fashion Industry

Understanding key challenges and drivers of 3D adoption

November 2020



Contents

2	Foreword
3	Executive summary
4	Approach and methodology
5	The state of play for 3D virtualisation
8	Why is it difficult for fashion and apparel companies to adopt 3D?
	– Different expectations towards change
	– Complexity is underestimated
	– Capability comes from within
	– Technology is not interchangeable
	– Partners need to be engaged
16	Key considerations for successful 3D adoption
21	Acknowledgements
21	References

Foreword



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3D technology has transformed industries such as the automotive, aerospace and recently the furniture sector. Soft goods, in particular fashion, has not been transformed in a similar way to its industrial hard goods peers, with complexities ranging from limitations to creating life-like, digitally rendered 'soft' materials, to the belief that inspiration can be stifled in the digitisation of creative processes.

The fashion industry has been growing steadily since 2015, with 2019 increasing global sales to USD 1.7 trillion dollars¹. In 2020, the game has changed and it is time for the industry to transform, or be transformed. Aside from business disruption from COVID 19, new players with new business models are emerging to disrupt established industries. Business leaders are not looking for incremental change of the business, but a fundamental transformation to maintain relevance to customers. Could digital be the solution?

Business leaders from fashion brands and retailers have acknowledged the significant gains in efficiency and sustainability due to 3D product virtualisation, but the slow adoption seems at odds with the fast-paced world of fashion. This indicates gaps between strategic intent and operational execution. This paper aims to provide much needed understanding of the drivers, challenges and benefits of 3D for the retail and apparel industry. In addition to interviewing over 30 industry experts and surveying over 100 fashion industry executives, there are a selection of quantitative analysis and insights to guide business leaders to explore details regarding 3D use cases, adoption trends and complexity of the 3D ecosystem.

The paper embodies Weave's commitment to helping leaders understand the requirements and implications of 3D virtualisation. We are confident that the findings will support companies who are walking towards the journey of digital transformation to achieve optimal benefits for the business and for society. We would like to thank all the digital leaders and industry experts who contributed to the insights and recommendations in this paper.

A handwritten signature in purple ink that reads "Delman".

A handwritten signature in black ink, appearing to be "Paul Lennen".

Executive summary

With intensified competition from fast fashion companies and disruption from COVID 19, apparel companies have seen the need for speed-to-market, customer-centricity and supply chain resilience. 3D product virtualisation is an enabler to these benefits, known to deliver value in both product development and manufacturing in automotive, furniture and other hard good industries for the last 20+ years. However, fashion and apparel companies are still in the early stages of adoption.

Weave conducted an extensive market research, interviewing 30+ industry executives and surveying 100+ participants to understand the state of 3D adoption and the associated challenges that companies have faced.

The research indicated 5 key findings, the first of which is an overarching theme that is independent of where the company is on their progression towards 3D, with the other 4 are specific to each respective stage of 3D maturity. The maturity stages used in this study are awareness, considering, piloting and scaling.

1 – Leaders and operators have different expectations towards change. For example, in the awareness stage, leaders cited that the lack of innovation mindset was the biggest challenge to 3D adoption, while operators consider organisational change as the top challenge. This gap in expectations can be attributed to inadequate change management and communications, which can be due to decision-makers adopting a quick-wins approach, due to constraints of organisational structure and functional scope. Research identified that nearly 70% of 3D virtualisation initiatives often start with product development use cases, even though sell side use cases potentially generate 4-5 times higher return on investment (ROI). It was observed that despite operators pushing back against change due to concerns on organisation and skills gap, these concerns were not addressed by leaders until later stages of adoption. Thus the misalignment between leaders and operators is a key roadblock for 3D adoption.

2 – Decision-makers underestimate the complexity of 3D adoption. Successful adopters insist that 3D adoption requires a complete redesign of existing ways of working and organisational capabilities, however 1 in 3 decision-makers see it as an IT tool upgrade opposed to a holistic operational model change. In all cases investigated, business led transformations are more successful than independently led initiatives (i.e. by innovation teams), as more practical business solutions are developed, creating operational adoption, not barriers.

3 – Lack of talent is not the main blocker to a successful pilot, a lack of training and allocating time are. An analysis of 100 3D talents indicates that 98% of talent **comes from within the industry**, not from other sectors or technology

firms. 47% of respondents see lack of skills as a blocker, but the lack of investment in training and time creates a self-fulfilling prophecy; concerns are not addressed, no KPIs or incentives are used to encourage new ways of working, culminating in low confidence across the business that 3D will provide lasting benefits.

4 – 3D technology is not interchangeable and flexible, which is at odds with the rest of the ecosystem, with 33% of respondents agreeing. As companies move away from having one central IT system (i.e. ERP, PLM etc.), to having many, each with their own specialties (i.e. 3D design, 3D fit tools, digital asset management), there is anxiety when looking to adopt 3D at scale due to portability to move seamlessly between applications and providers.

5 – Value chain partners need to go on the journey together in order to unlock true benefits. ROI is asymmetric across the value chain – brands stand to benefit more from 3D than their manufacturing or raw material counterparts by more than 20%. For the ecosystem to thrive, this needs to be addressed proactively.

In order to achieve 3D adoption and deliver the expected ROI, Weave recommend businesses focus on 5 key areas to aid adoption:

- 1. Don't start with technology, start with a business need;** create use cases where it will unlock a current unmet business need, then substantiate with a quantified ROI model (Weave example included)
- 2. Start small and take iterative customer feedback loops;** lock down process, allowing adjustments through customer feedback loops enabled by co-creation workshops and engagement sessions
- 3. Build capabilities from within, empowering project teams with accountability;** dedicate time for critical operational talents to come to terms with 3D and provide ways to tailor it to your business
- 4. Set realistic, achievable timelines and expectations for implementation;** changing a business model is difficult, adopting agile ways of working will enable pilot teams to adapt and adjust in situ
- 5. Create excitement using executive sponsors to scale;** with value chain partners and internally, scaling requires top management to own and drive KPIs relating to partnership engagement

In summary, we believe fashion and apparel companies need to start initiating a plan to adopt 3D virtualisation now in order to stay competitive and relevant in the digital age. The benefits of 3D are apparent, with the delay in adoption expected to cause significant damage to competitiveness and customer experience.

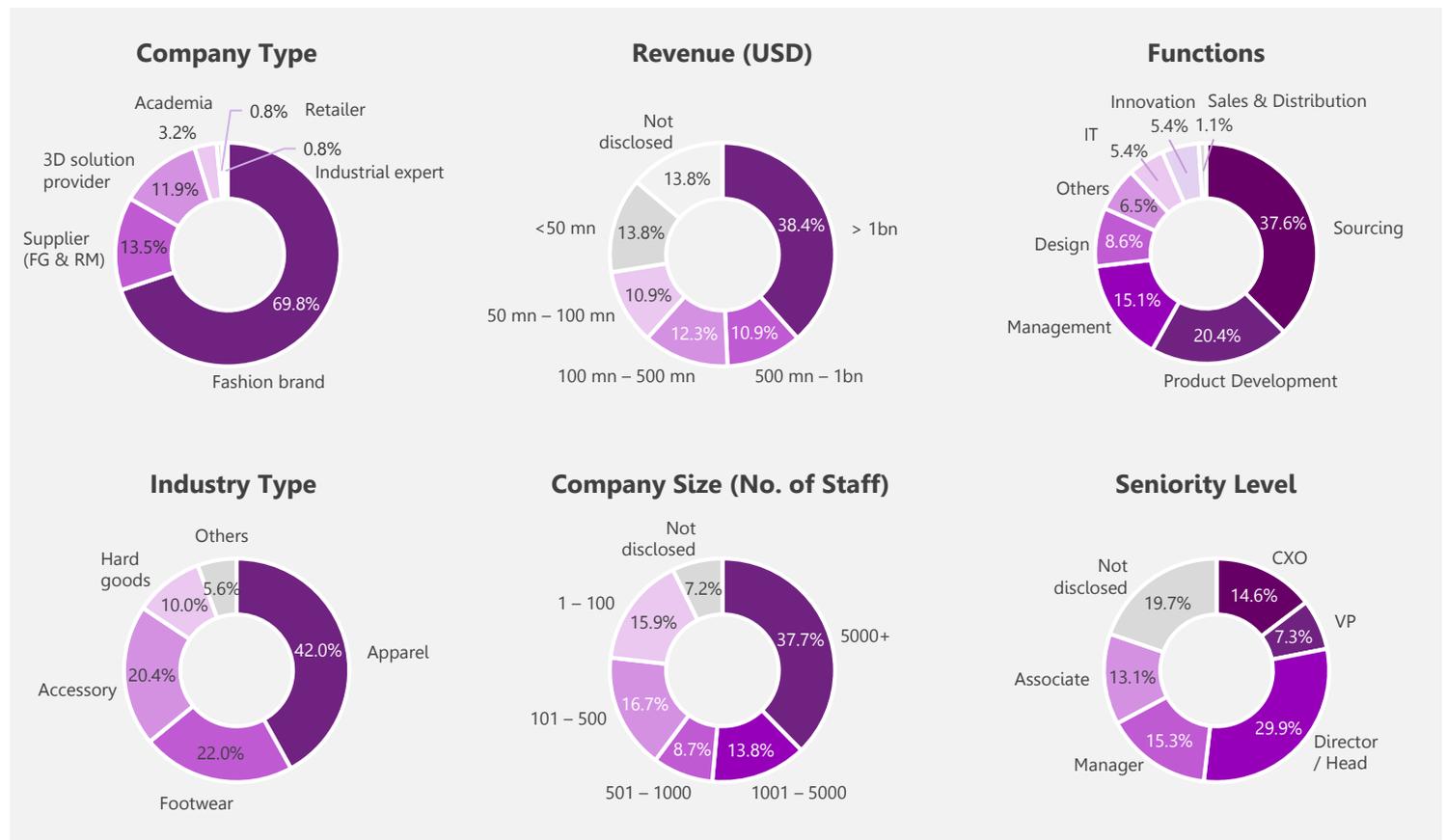
Approach and methodology

The findings presented in this report are derived from an extensive industry survey of 138 leaders from the fashion and apparel industry, 3D solution providers, academia and other industrial experts, supplemented by over 30 one-to-one interviews to dig deeper for insights and validation.

The survey and interviews capture perspectives of different parties within the fashion and apparel industry:

- Functions: C-suite, designers, merchandising, sourcing, sales and marketing, IT, and innovation team
- Value chain players: Suppliers, brands, distributors and retailers
- Other parties: Freelance 3D designers, academia, media and 3D solution providers

The sample is clearly differentiated and spread across company size, type, function, industry, and revenue segments as well as type of players, percent of respondents, n = 138.



To analyse the responses, we divided the 3D virtualisation process into 4 steps;

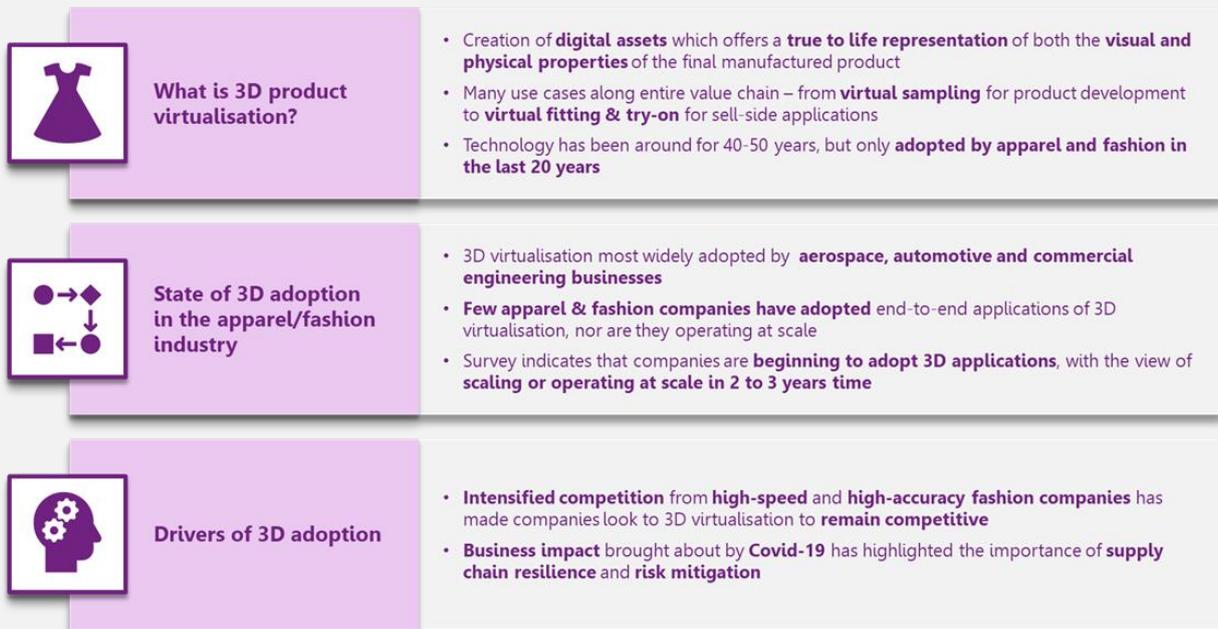
1. Awareness: No use cases in action, with the business/individual at a low knowledge level on 3D virtualisation
2. Considering: No use cases in action, with a medium to high level of knowledge on 3D, its practical application and discussions on how to implement starting to occur
3. Piloting: 1-2 use cases in action, considered as the 'Proof of Concept' (POC) phase where 3D virtualisation has been actively used in the business
4. Scaling: Where more than 1 use case is in action, with a decision to roll or scale the 3D virtualisation technology across multiple teams or business units.

The state of play for 3D virtualisation

Fashion and apparel companies are in the midst of a forced transformation; in part due to the economic uncertainty, in part also to changes in competition that have led to profit margin reductions². In response to the pressure for meeting growth and efficiency targets, fashion and apparel brands are adopting new innovations across production design, manufacturing, merchandising, and selling. Among these innovations, 3D product virtualisation has been on the cards for the past 10-20 years and has recently become a particular focal point due to the ongoing COVID 19 pandemic. 3D product virtualisation offers a unique opportunity to become more customer-centric, to improve speed to market by reducing lead-time for various processes along the product lifecycle – but these are not its only benefits.

The objective of this section is to present an overview of 3D product virtualisation, its current state of adoption, and drivers of 3D adoption.

Illustration 1.0 – Summary of situation section



What is 3D product virtualisation?

3D product virtualisation is defined as the creation of a digital asset which offers a true to life representation of both the visual and physical properties of the final manufactured product. This digital asset can be used in multiple use cases along the product development and sell-side process, for different parties along the value chain (Illustration 1.1). Some common use cases include material digitisation, virtual sampling, digital cataloguing and showrooming.

By using digital assets and tools, fashion and apparel companies are able to gain competitive advantage reducing physical sampling costs, increasing speed-to-market through reducing product development lead-time, improving assortments by leveraging Voice of Consumer (VOC) feedback gained from pre-selling products enabled by digital assets.

State of 3D adoption in fashion and apparel industry

Industries such as aerospace, automotive, and engineering have widely adopted and benefitted from 3D virtualisation since the 1980s (Illustration 1.2). In contrast, few fashion and apparel companies have fully embraced 3D product virtualisation throughout the entire product development and selling process, with even fewer doing so at scale across all product lines. It was only in November 2019 when one of the leaders in fashion and apparel, PVH Corporation, announced their ambition “to achieve 100% 3D apparel design by its Spring 2022 collections”³.

According to Weave’s survey, only 17% of survey respondents have adopted 4 or more 3D use cases; with that percentage expected to increase to 24% in the next 2-3 years (Exhibit 1.0). In contrast, most companies without use cases adopted today (35%), indicate that they do not expect to adopt use cases in 2-3 years time (34%).

Furthermore, only 30% of surveyed companies were scaling or have enough use cases to be considered as operating at scale (Exhibit 1.1). However, the companies planning to scale or operate at scale rises dramatically to 65% in the next 2-3 years, indicating that 3D awareness is on the rise. Firms need to challenge themselves if this dramatic shift towards digital can be done in a short time, particularly when considering that product design and virtual sampling are the most popular use cases amongst surveyed firms (Exhibit 1.2). Sell-side use cases have the least adoption currently, though there are more upside benefits than in design and virtual development, which will be covered in the later section.

Exhibit 1.0 – Number of 3D use cases adopted (Today vs. In 2-3 years), n=80

Currently most companies are trialing some form of 3D virtualisation, but in 2-3 years most want to be operating at scale

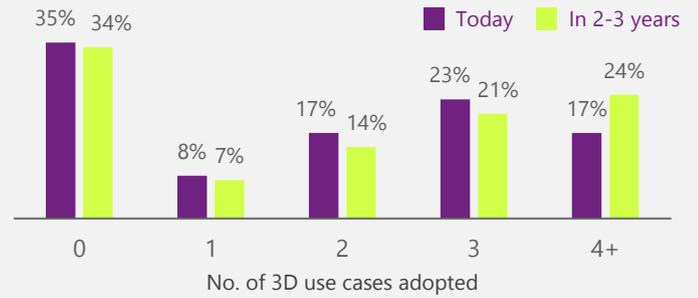


Illustration 1.1 – 3D use cases for fashion and apparel sector (non-exhaustive)



Illustration 1.2 – Evolution of 3D technology: 3D use cases adoption

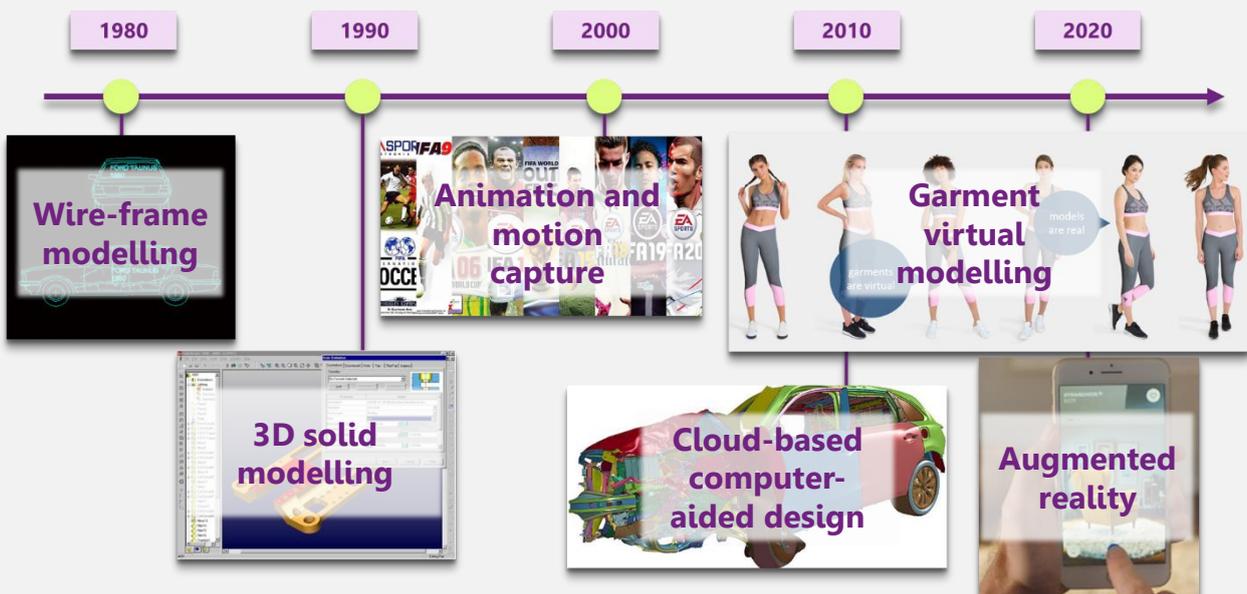
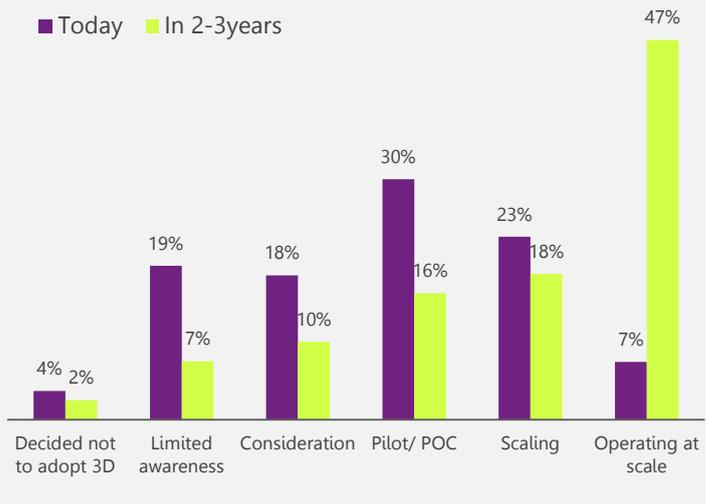


Exhibit 1.1 – 3D virtualisation adoption stages (Today vs. In 2-3 years), n=88



Drivers for 3D product virtualisation adoption

Intensified competition from high-speed and high-accuracy fashion companies

The increase in appetite for 3D applications may be due to the intensified competition within the fashion and apparel industry. In 2010, Inditex overtook Gap to become the largest fashion and apparel retailer by sales. Since then, Inditex has gone on to achieve a market capitalisation of over 12 times the size of Gap⁴.

The success of Inditex, a leader amongst “fast fashion” brands, have often been attributed to speed-to-market⁵. However, speed is only part of the value equation and is not sufficient to defend against the customer-centric fast fashion business model:

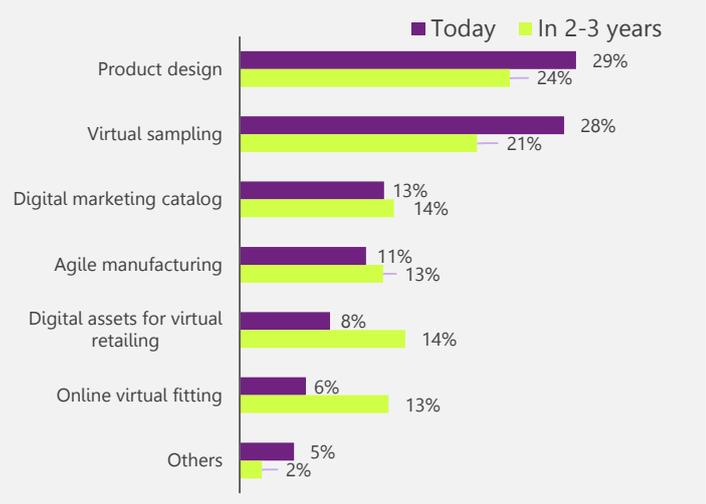
“Inditex’s success is based not on speed but on accuracy, on understanding exactly what customers want, week by week, and store by store.”

Pablo Isla, Chairman & CEO Inditex

Research shows that the current lifecycle for a garment is between 34-61 weeks⁶, of which the product development process consumes 32-52%. Given the manufacturing and shipping lead times associated with physical samples, there is an opportunity for digital assets to unlock process efficiencies across design, development and sell-in, such as enabling collaboration between designers, reducing the time between design iterations and the number of samples required.

With shorter lead times, fashion and apparel brands can develop an agile supply chain to be more responsive to consumer demand. For many companies, finding ways to bring their product development and delivery cadence into line with the pace of market trends will be vital to compete against new high-speed, high-accuracy fashion competitors.

Exhibit 1.2 – 3D use case adoption (Today vs. In 2-3 years), n=80



However, true benefit of 3D product virtualisation can be realised only if it is in conjunction with Voice of Consumer analytics. Companies who are successfully able to implement both and ensure a collaborative ecosystem (from design to manufacturing) will unlock genuine competitive advantages and generate value from 3D adoption.

COVID 19 emphasising the importance of resilience

The COVID 19 global pandemic has highlighted the importance of supply chain resilience and risk mitigation, with unprecedented changes like working from home, cancelled trade fairs, buy trips and fashion shows becoming the norm in 2020. As a result, companies are often faced with a stark choice between identifying new ways of conducting business or ceasing activities all together. It is a need for resilience which now might make 3D product virtualisation be considered an essential for survival.

Product design and development have traditionally required in-person reviews of physical samples. With the changes in ways of working, fit testing suddenly involved transporting samples and mannequins, as well as conducting line reviews via video calls. Many in the industry say that effectiveness and efficiency of product design and development has been reduced.

From Weave’s research, it was observed that COVID 19 has been significantly less disruptive for companies who had already adopted 3D product virtualisation. Development teams were able to conduct much of their work from home using 3D software and collaborate virtually with suppliers. For companies already using 3D product virtualisation, COVID 19 has helped leadership teams to appreciate the value of 3D technology from a resilience perspective.

So, if the perceived benefits of 3D product virtualisation are great, what is restricting 3D product virtualisation from being widely adopted in the fashion and apparel industry?

Why is it difficult for fashion and apparel companies to adopt 3D?

The objective of this section is to provide a framework to understand various challenges faced by fashion and apparel companies adopting 3D product virtualisation.

Survey results indicated that there was one overarching theme of mindset gaps between business decision makers and operators of the process. Underneath this theme, it was fascinating to note that the changes faced by leaders and by operators varied with the maturity of the company towards 3D - from awareness through considering (no use cases), piloting (1-2 use cases) with a Proof of Concept (POC) and then scaling 3D across the business (2+ use cases). In order to give this the right context and depth, we will start with the mindset gap and then progress through each of the four major issues at the different stages of adoption.

1	2	3	4	5
DIFFERENT EXPECTATIONS TOWARDS CHANGE <ul style="list-style-type: none"> Knowledge is the entry barrier Benefits are not clear to current paradigms <ul style="list-style-type: none"> PD seen as quick wins Sell-side big but slow Expectations set are not realistic 	COMPLEXITY IS UNDERESTIMATED <ul style="list-style-type: none"> Operational-led change is better than innovation-led Complexity is underestimated Adaptive working helps teams transition quickly Operations teams push back if not engaged 	CAPABILITY COMES FROM WITHIN <ul style="list-style-type: none"> Skills seen as biggest gap Creates self-fulfilling cycle <ul style="list-style-type: none"> Concerns of teams are not resolved KPIs & incentives not linked to new working Time and money not invested in training 	TECHNOLOGY IS NOT INTERCHANGEABLE <ul style="list-style-type: none"> Change from '1 to many' systems Systems are not flexible to file formats Data loses its value 	PARTNERS NEED TO BE ENGAGED <ul style="list-style-type: none"> Asymmetric benefits seen across the value chain <ul style="list-style-type: none"> Brands get most value Complexity sits with manufacturers and raw material suppliers



Knowledge is the entry barrier

The biggest issue seen to the adoption of 3D was 'lack of innovation mindset' (Exhibit 2.0). The interpretation of 'lack of mindset' consensus amongst interviewees is that 'teams don't know what they don't know'. When pushed further, it was clear that operators and decision makers alike agree that providing more information in terms of benefits will lessen this risk.

A recent study indicates that businesses having a clear change story rated as the top success factor for digital transformation, with teams able to do this clearly were up to 3 times as likely to succeed⁷. So if teams need a clear story to succeed and more information is the key – why don't we just provide more information?

This answer is further complicated when evaluating responses by each stage of their 3D maturity (refer Exhibit 2.0). It becomes clear that at different stages of the business transition, decision makers who provide information, and the operators who consume it, have different priorities.

"Knowledge is a barrier to entry – people do not know enough."

COO at J. Hilburn

Exhibit 2.0 – Top challenges to 3D product virtualisation adoption, n=106

Lack of innovation mindset is seen as the biggest blocker to adoption, followed by lack of skills and clarity of benefits.

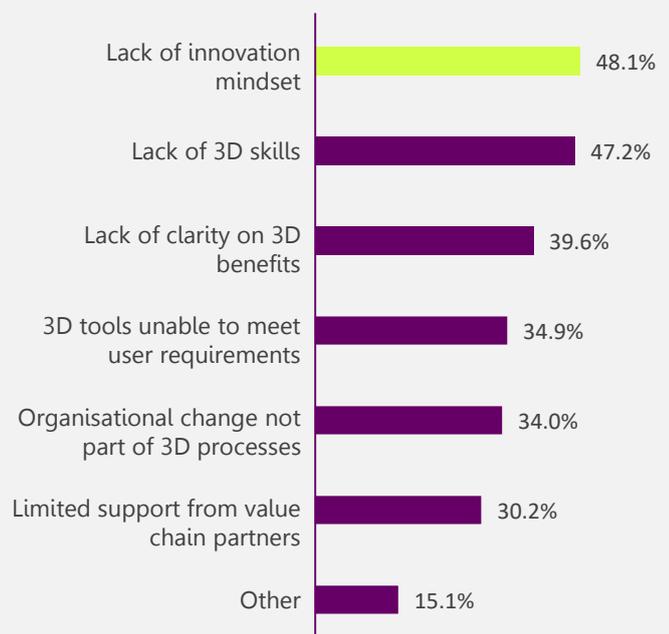
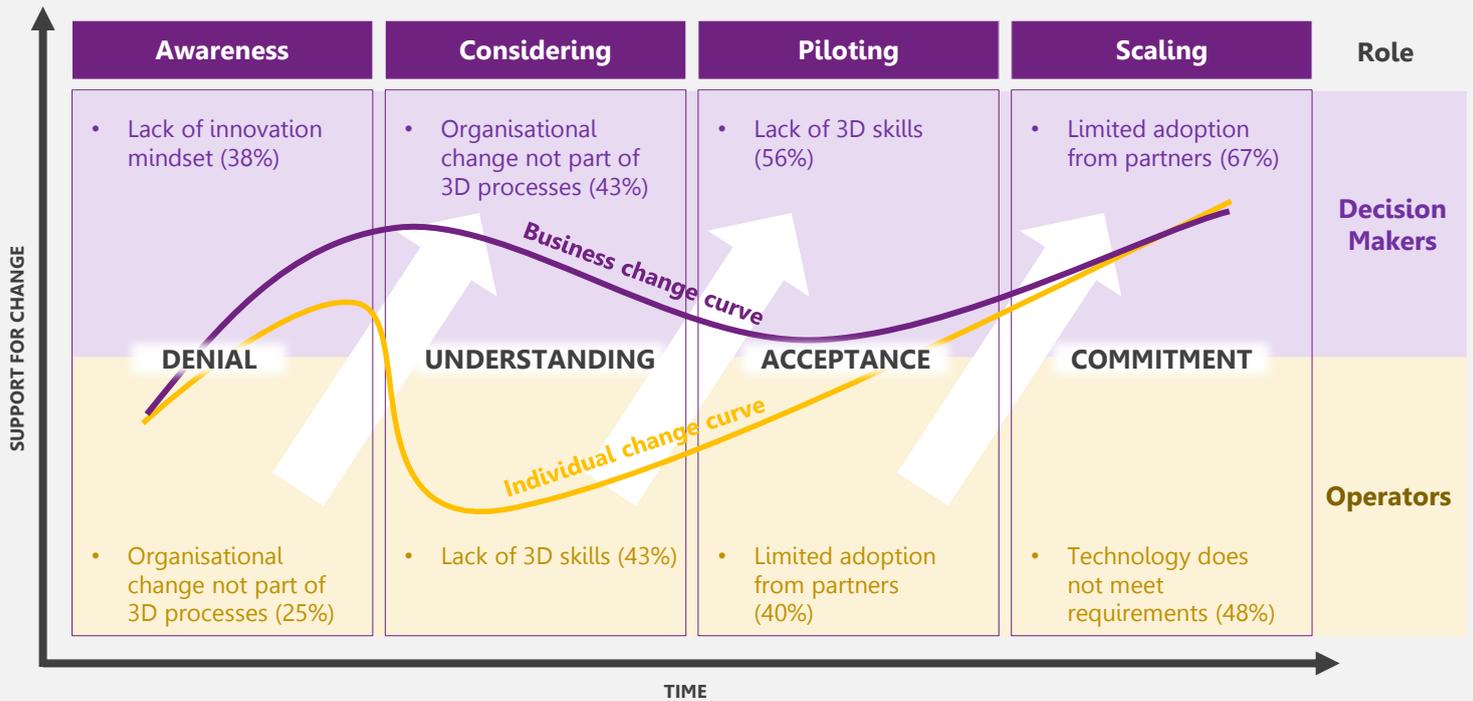


Illustration 2.0 – Top issues identified at each stage of adoption journey, split by operator and decision maker

Key concerns of operators occur one stage before they are the key concern of the decision makers in the business



Source: Weave industry survey and interviews — *Why 3D adoption is low among fashion and apparel industry?*, n=136

In fact, it was seen that the top issue for operators was one phase before the decision makers of the business. This may be a surprise to the business as individuals are perceived to adapt change slower than the business. Such behavioral observation gives rise to new view on how business should manage change effectively.

Discussing this new paradigm with interviewees all led to an uncomfortable realisation that, as one COO put it – ‘we all know the team is thinking what we are, just didn’t realise it was this quick’.

Benefits are not clear to current paradigms

As shown in survey results, 20% of respondents do not perceive that 3D benefits justify investment. Although the

remaining 80% perceive benefits, 50% cited that they did not know exactly what the benefits could be, indicating that most have an idea that 3D can help, but they cannot adequately define or express it.

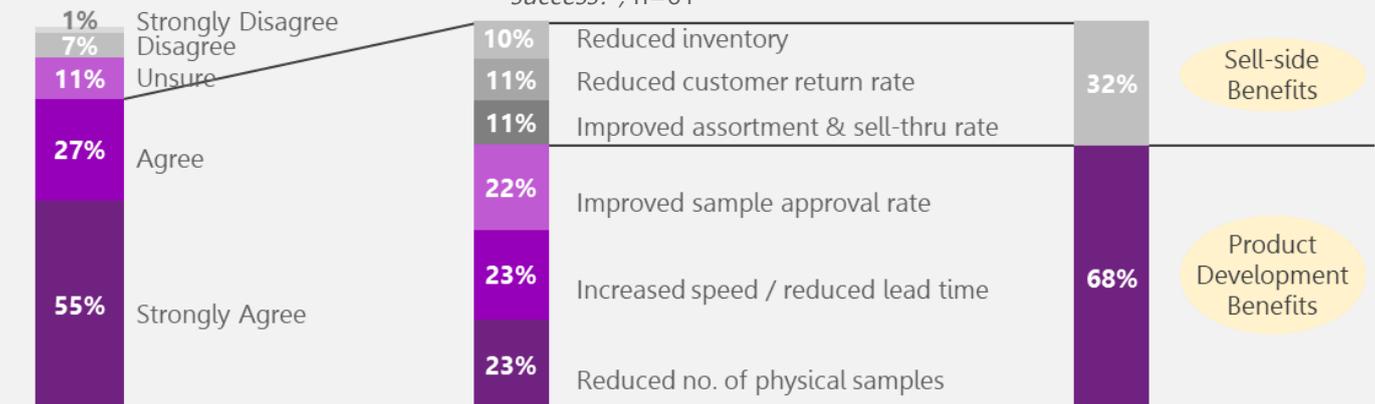
Weave’s research showed that 68% of participants look to Product Development use cases to deliver 3D benefits, such as lead time reduction, physical sample reduction, and improved sample approval rate (Exhibit 2.1). However, since brands rarely compensate suppliers directly for samples, they are unable to realise and quantify savings from 3D investments. This leads to lower motivation and urgency for brands to invest in 3D. Instead they mandate their suppliers to invest in 3D virtualisation tools.

Exhibit 2.1 – Survey results of 3D benefits

Over 80% of interviewees agreed to 3D benefits, but around 56% of which were still convinced the lack of alignment and clarity on 3D benefits hinder 3D adoption

“Do you agree on 3D benefits?”, n=75

“Which of the listed benefits does your organisation use to measure 3D success?”, n=61



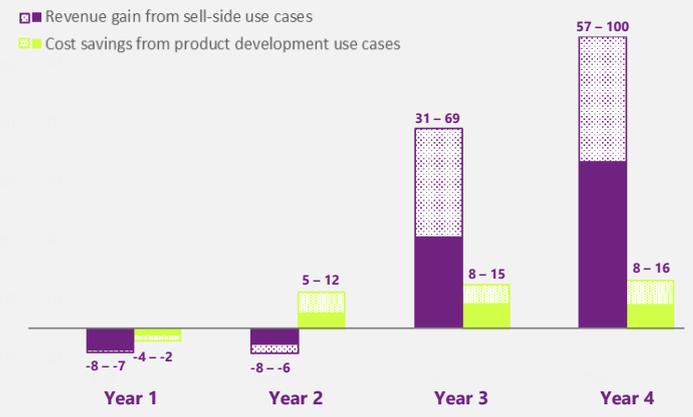
For brands to create a compelling business for 3D product virtualisation, they must consider sell-side use cases – such as digital showroom, digital catalogue, virtual fitting, etc. – which unlock both revenue enhancement and cost reduction (Exhibit 2.2).

It is apparent that 3D benefits depend on the position of the firm in the apparel value chain and there is clearly a benefits asymmetry among value chain partners. Incentives are available for all members of the value chain and multiple use cases for both Product Development side and sell side to adopt.

Expectations set are not realistic

Weave’s research indicated that leaders of 3D adoption have a clear agenda which drives their investment in 3D use case despite lacking a fully developed business case.

Exhibit 2.2 – Comparison of ROI (min-max) ranges between sell-side and product development use case (scale indexed up to 100)



“If we had started our business case with the [expected] benefits... we would have been completely wrong. We found benefits in areas we had not thought of... and it was fantastic.”

Anne-Christine Polet, SVP HATCH & STITCH

This is also evident from the fact that 30% of respondents expects a positive ROI with less than 12 months payback, while leaders who have implemented 3D successfully understand that the expected payback to be in the range of 36-48 months. This is a big gap in expectations, causing many business to under commit spend to 3D or to be quick to call it a failure if it quickly doesn’t provide returns. The importance of having a robust ROI calculation approach is critical to being able to get a business case approved and to set the right expectations.

Pro Tips!

If you want to create a business case and have strict ROI business case requirements, look for categories and products that are rolling/ongoing products that have minor colour and fabric finish changes between seasons. 3D virtualisation can quickly reduce the number of samples and product approval time, giving you a short ROI with tangible cost savings that you can leverage with your vendor partners.

COMPLEXITY IS UNDERESTIMATED | OPERATIONAL-LED CHANGE IS BETTER THAN INNOVATION-LED | COMPLEXITY IS UNDERESTIMATED | ADAPTIVE WORKING HELPS TEAMS TRANSITION QUICKLY | OPERATIONS TEAMS PUSH BACK IF NOT ENGAGED

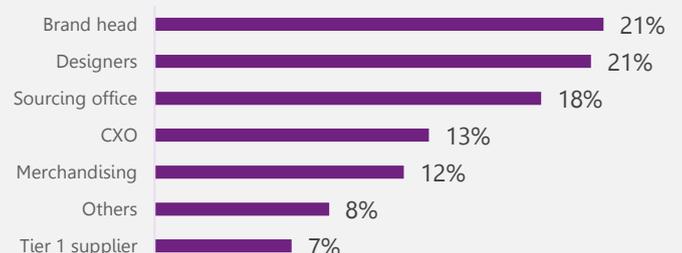
Illustration 2.1 – Misunderstanding of 3D change complexity leads to strong pushback from operational team

<p>Oversimplified approach adopted</p> <p>Operational-led vs. Innovation-led</p> <p>Leaving 3D as an Innovation-led approach only, leads to lower adoption</p>	<p>Decision makers not understand 3D changes</p> <p>1 / 3</p> <p>of decision-makers underestimate the complexity of adoption</p>	<p>Fail to adopt iterative ways of working</p> <p>Unable to address cross-functional interdependencies</p>	<p>Pushback from Operational Team</p> <p>52%</p> <p>agreed opposition from staff due to lack of understanding of changes required</p>
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Innovation can start at any level of an organisation. From Weave’s research, CXO and brand heads only represent 35% of people who are driving 3D adoption, with the remaining coming from operational team members and ecosystem partners (Exhibit 2.3).

Starting innovation is not difficult, but adopting innovation is. In fact, the companies that are implementing 3D without having a big picture view

Exhibit 2.3 – Ownership of 3D initiation, n=93



encounter more difficulties and pushback from operational teams in the long run. The key reasons are that decision makers underestimate change complexity and therefore adopt oversimplified ways of working.

Operational-led change is better than innovation-led

Multiple interviewees including Lena Lim, Chief Commercial Officer at Browzwear, commented that,

“Many companies struggle to adopt 3D product virtualisation across a business because of taking an innovation-led approach to 3D adoption, opposed to an operational-led one.”

Lena Lim, Chief Commercial Officer at Browzwear

The reason being that innovation teams were found to prioritise experimentation and operate in a silo with minimal or no operations team participation. Furthermore, innovation charters reviewed did not include practicalities of implementation, change to business and scaling-up. In contrast, operational-led initiatives tended to over-emphasise process and organisational aspects, focusing on the responsibilities of adoption on the users, making it easier for operational teams to understand the changes that need to happen.

Complexity is underestimated

But why do companies adopt innovation-led in the first place? Localised adopters often do not have a comprehensive, business wide view of the implications of adopting 3D. From research, 1 in 3 respondents underestimated the complexity of 3D adoption, thinking it is only a simple technology tool change, whereas 3D adoption requires both organisation and process changes. Thus, the failure to understand the change complexity leads organisations to adopt oversimplified approaches.

Adaptive working helps teams transition quickly

3D initiatives require an astute focus on integration of business process and 3D tools. Often, it is observed that organisations treat 3D as a standalone tool deployment and overlook changes needed across the organisation to address the lack of process alignment, urgency for change, and incentives (e.g. KPIs, etc.) across business functions.

Traditional apparel organisations are functionally oriented, coupled with processes that has evolved from bootstrapping to ‘make things work’. Lean and improvement teams exist to reduce non-value add and ensure that productivity of the process is locally optimised. This combination of locally optimised processes and ways of working make it difficult for apparel companies to initiate and change new ways of working on scale. It is therefore difficult for any change initiative, which requires support across the entire organisation, to achieve widespread adoption.

There are commercially available practices that can be used to correct organisational dysfunction and breaks in communication, with ‘Agile’ leading the charge. Agile was used as a term first in the IT sector in 2001⁸ and now describes a number of methodologies that centre on team interactions, continuous process refinement and regrouping regularly to adjust to the latest information.

Organisations can change processes to fit 3D requirements in an iterative way by diligently evaluating the impact. Starting small was noted as key, with many companies commenting that big bang attempts at change have not been successful. Small steps, with iterative customer feedback links are crucial to starting the review of key processes.

Deep dive

From industry experience, a common problem companies face in their costing activities is a 1) lack of accountability and 2) lack of transparency for the Total Cost of Ownership. This phenomenon can be attributed to process complexity – i.e. multiple teams being involved, each being responsible for different parts of the total cost, and being tracked by different KPIs.

For example, the sourcing team is focused on material costs, the logistics team is focused on minimising shipping costs and merchandisers are concerned with profit margin – one change in either of the components may have a negative impact on another cost component but teams regularly overlook this as there is no governance structure to track the impact on lifetime cost. This lack of end to end accountability makes it difficult to manage the lifecycle cost of the product and some opportunities can be missed.

Operations teams push back if not engaged

Empowerment of operational staff with understanding and knowledge of 3D is key prior to launching a pilot as many team members may be completely unfamiliar or have only heard of 3D as a buzzword, and thus would not fully comprehend what 3D is and the implications of adopting 3D.

The lack in understanding becomes the biggest source of hesitation for operational staff. This is best summed up by the COO from J. Hilburn, “Knowledge is a barrier to entry – people do not know enough.”

Pro Tips!

75% of initiatives were started by people who were not C-level contributors. What does this tell us? 3D initiatives do not necessarily need C-level approval. Only 40% of companies with 3D programs moving to scale indicated that the C-level were critical in driving adoption. Think about how to activate a start-up mindset in your business: fail fast and win on momentum.

CAPABILITY COMES FROM WITHIN

- 1
- 2
- 3
- 4
- 5

SKILLS SEEN AS BIGGEST GAP



CONCERNS OF THE TEAMS NOT RESOLVED



INCENTIVES NOT LINKED TO NEW WAYS OF WORKING



INSUFFICIENT INVESTMENT IN CAPABILITY BUILDING



Skills are seen as the biggest gap to pilot success

52% of interviewees agreed that firms have not been able to adopt 3D due to opposition from employees citing concerns relating to reskilling, with a further 47% survey respondents agreeing that a lack of 3D skill is the largest factor hindering 3D adoption in the pilot stage.

However, Weave’s analysis of 100 3D designers across regions indicated that over 80% began their journeys in fashion and apparel industry as creative designers, technical designers, merchandisers, pattern makers, business trainees in fashion and apparel companies, or teachers in fashion schools (Illustration 2.2). This finding debunks one of the biggest myth’s with 3D talent – **talent can, and does, come from within.**

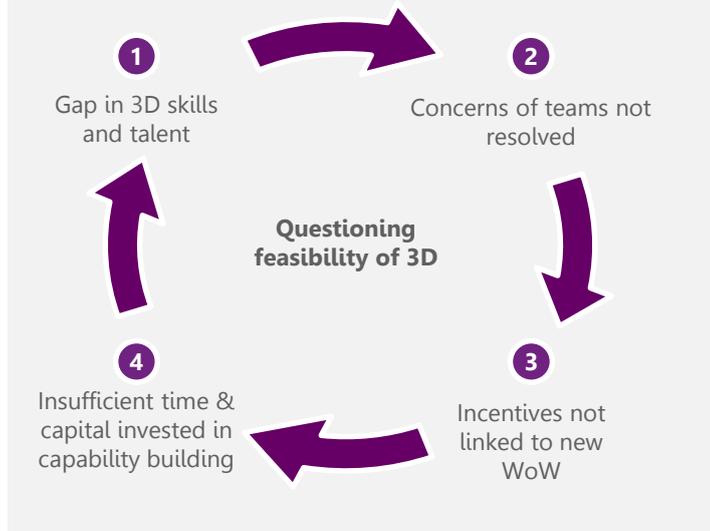
Furthermore, with increasing availability of 3D vocational training through fashion schools and private training providers, there are increasingly more resources available to help companies manage this transition. From a sample of 20 leading fashion schools around the world, 16 had 3D included in their curriculum.

Despite the availability of external training resources available, companies often fall into a vicious cycle by underestimating the investment needed to build capability internally (Illustration 2.3).

Concerns of the teams are not resolved

Designers and Merchandisers often have high expectations that virtual samples will replicate most

Illustration 2.3 – Self-fulfilling cycle of 3D adoption

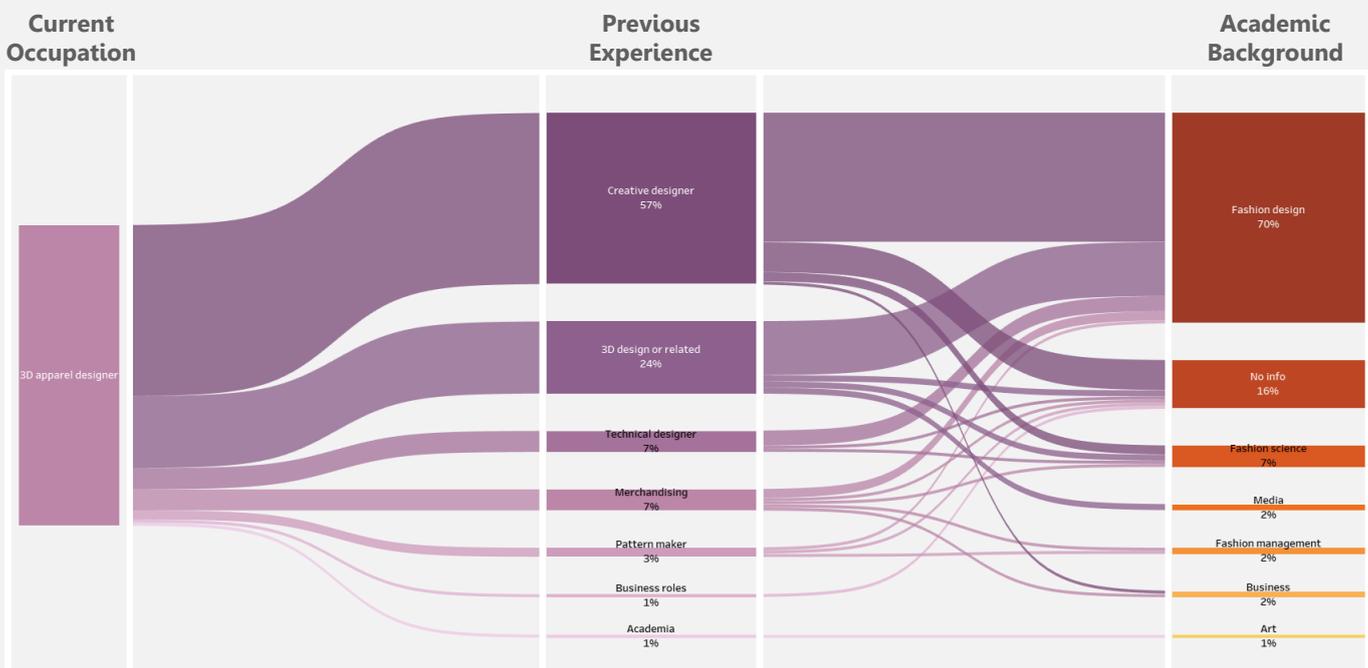


features of a physical sample. Weave’s survey indicated that the top 3 capability gaps between physical and virtual samples is lack of hand feel, accurate fit simulation, and inability to leverage VOC feedback using the current 3D tools adopted by respondents (Exhibit 2.4).

As the 3D technologies are not yet mature, a gap between physical and virtual sampling will continue to exist in the short term. The way forward is to wisely choose a trade-off between expectation and the value generated by 3D

Illustration 2.2 – Sources of 3D talent

98% of 3D talents researched in the market have previously worked in fashion industry and around 80% majored in fashion-related programs, n=100

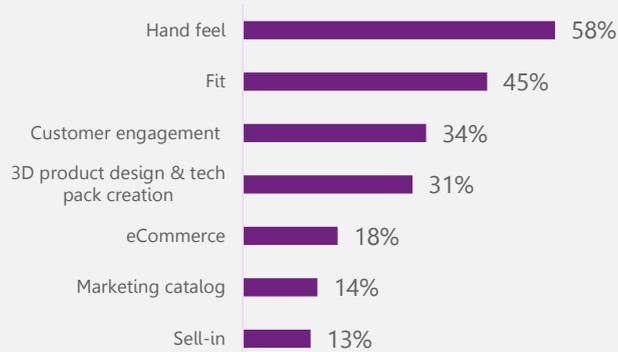


virtual samples. Designers and Merchandisers can adopt a pragmatic middle approach rather than outrightly rejecting virtual samples. One approach taken by a leading sportswear brand is to have material swatches of different gauge materials to assist the digital image transition of the team with hand feel.

"Designers worry that the technology would replace them"

Yan Chan, Director of Business Development of The Hong Kong Research Institute of Textiles and Apparel (HKRITA)

Exhibit 2.4 – Top capabilities gaps of 3D tools, n=80



Insufficient time and capital is invested in capability building

While training internal employees is a potential solution to address the 3D gap, companies underestimate the efforts required for 3D training and allocate insufficient budget. According to Weave's research, 78% of companies are investing less than 10% of their available technology budget on 3D virtualisation, of which only 23% is allocated to training and capability building. With many providers on the market for not only specialised training for current employees, but also new talent, this area needs to be considered in technology procurement decisions.

When looking for external talent, the speed of adoption of technology has led many to think of fashion as a "blue-collar industry", leading to an inability to attract high-skilled 3D talent from other adjacent industries – such as gaming, media, entertainment etc. This is a two-way relationship though, with many 3D designers commenting that the fashion and apparel industry is difficult to become a member of due to the complexity in the product design process, requiring fashion skilled people to explain elements of the process to designers.

All of these factors combine for companies to question the feasibility of 3D investments, perpetuating the vicious cycle. Brands who are serious about 3D virtualisation need to explore ways to increase 3D talent internal and external channels.



Pro Tips!

3D talents can be grown from within, in fact 98% of a sampled 100 3D talents had practical work experience in fashion and over 77% have an academic background in fashion. Companies need to re-energise the way that they look at talent for 3D. Growing skills from within is the secret sauce to gain widespread adoption within your teams. Look deep within your teams and identify people who would enjoy learning and free up their time to nurture this knowledge – the time must be on company time and with company resources. Build it and they will come.

Deep dive

Another underlying driver for resistance towards virtual samples is lack of understanding of sample costing. It is not well understood by Designers or Merchandisers that sample cost, though offered at no cost initially, are hidden into the FOB costing Sourcing teams receive from suppliers during bulk purchase. As a consequence, impact of virtual samples cannot be easily seen on an individual departments P&L, thus offering limited incentive for change.

Physical samples impact the EBITDA and also leads to long product development lead times. Thus, Designers & Merchandisers need to take a CFO view to physical samples – can it be quicker, more flexible and less EBIT spend to be done virtually? Finance teams with oversight of the entire organisation need to support operational teams with these costs – it will provide them with the information they need to drive change.

KPIs and incentives not linked to new ways of working

Creative Designers have traditionally been working with physical media. Their core competency has been creativity rather than mastery of a digital design tool. With the introduction of 3D virtualisation tools, Designers are necessitated to use 3D tools as part the creative design process, meaning that Designers are now forced to spend additional effort to learn tool related skills.

Other roles within the design department that are more familiar with 3D tools, such as Pattern Makers and Technical Designers, are also able to pick up 3D skills and pivot into more prominent roles in the design process. As a consequence design related decisions are no more an exclusive domain of Creative Designers.

It is therefore key for organisations to partner closely and build capability with Designers and Merchandisers when piloting in order to alleviate reskilling anxiety. A leader and early adopter of 3D virtualisation, Stitch, implemented a capability building plans and ensured familiarity and comfort of the team with the tools before embarking on the large scale POC resulting in a complete digitisation of an entire collection.

TECHNOLOGY IS NOT INTERCHANGEABLE

CHANGE FROM '1 TO MANY' SYSTEMS

SYSTEMS ARE NOT FLEXIBLE TO FILE FORMATS

- 1
- 2
- 3
- 4
- 5



Change from '1 to many' systems

The 3D tools ecosystem is highly fragmented with individual tools addressing technology needs for specific parts of the value chain. Instead of only using 1 generic system, companies are moving towards deploying multiple specialised tools. Such a collage of tools often makes 3D tool requisition tedious with multiple rounds of evaluation (Illustration 2.4).

3D technology for fashion and apparel sector is still in its infancy, hence limited efforts have been made towards inter-operability, third party integration and defining 3D asset standards. In the desire to develop specialist capabilities, 3D solution providers have picked a niche within fashion and apparel segments, meaning that brands or suppliers focusing on multiple categories – woven, knits, footwear, etc. – are forced to deploy multiple 3D tools.

According to Weave's research, 33% of respondents agreed that the fragmented 3D tool ecosystem was a challenge for companies looking to adopt 3D virtualisation, as they did not know where to start.

Systems are not flexible to file formats

Matthew Cochran from BeProduct, a leading digital fashion platform, highlighted that "there is no format developed in the foreseeable future for flexibility and interoperability of 3D assets, which makes people lose appetite for future scaling". The industry is expecting flexibility and portability to reduce cost of switching 3D tools and improve supply chain resilience.

"3D software companies have not reached that stage where files can be shared – that results in pain for the suppliers to invest in people and technology."

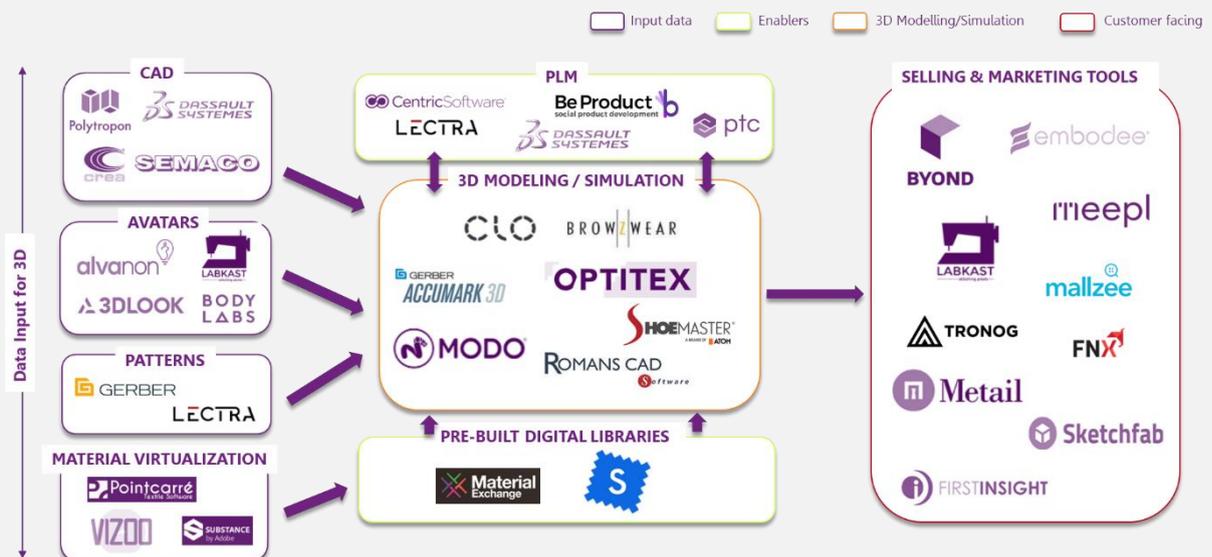
Director of Technical Services, US apparel company

However, the R&D collaboration among 3D tool vendors is still limited due to lack of data proliferation and sharing. The fashion and apparel world needs to embrace this shift towards decentralisation of data, that has been seen in other industries like music⁹, where data contributes to a flow of information and the file itself is not the value.

Pro Tips!

A governance process ought to be placed around how 3D tools and software are chosen. Before piloting or scaling any 3D tool or software, it is essential for companies to adopt a holistic and systematic approach to define the required set of tools and/or software (i.e. technology stack) to fulfil the requirements from the business. This approach enables the business to fully understand any interdependencies, between software (e.g. interoperability, file compatibility, etc.), without which companies could end up adopting multiple redundant systems and systems that are poorly integrated with one another; thereby increasing cost and reducing efficiency.

Illustration 2.4 – Technology stack for 3D product virtualisation



Source: Weave analysis; please note the list is not exhaustive. 3D systems do not adopt a flexible architecture meaning they allow integration with only limited partners in the ecosystem.

PARTNERS NEED TO BE ENGAGED

- 1
- 2
- 3
- 4
- 5

ASYMMETRIC BENEFITS SEEN ACROSS THE VALUE CHAIN



Asymmetric benefits seen across the value chain

3D benefits are maximised when all ecosystem partners embrace it fully. 3D virtualisation use cases require digital assets to be shared between value chain players. Without upstream partnership, downstream players may need to create the digital assets themselves, which significantly attenuate the ROI, due to increased investment required.

However, partnership between value chain players may not be so straight forward, with 1 in 3 of survey participants citing a lack of support from value chain partners, has hindered their adoption of 3D virtualisation.

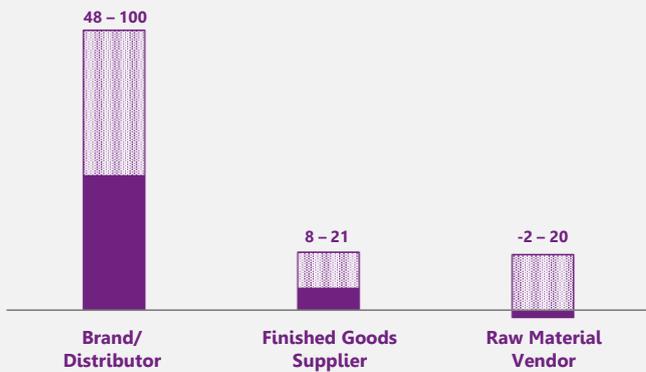
This can be attributed to an asymmetry of benefits and required investments between the value chain players. This observation was further substantiated from a simulation exercise using Weave's 3D ROI simulation model (Exhibit 2.5).

One can observe that the ROI for brands is much higher than that of the other value chain players. This is partly due to the fact that sell-side use cases – e.g. virtual fitting by ecommerce partners, VOC collection by retailer partner, etc. – deliver much higher return on investment through incremental revenue and reduced costs than cost savings from Product Development use cases.

Furthermore, required investments between parties are asymmetric, with both raw material vendors and finished goods suppliers often being required to procure multiple 3D tools to satisfy different customers' (brands and retailers) 3D tool preference in order to work seamlessly and secure future orders (Illustration 2.5).

However, it was rarely observed that brands provide any financial incentives or training support to suppliers in order to accelerate 3D adoption. In turn, suppliers should consider adopting a more strategic mindset to foster long-term business relationships with brands and retailers.

Exhibit 2.5 – Relative performance of 4yr ROI on 3D across supply chain players (scale indexed up to 100)

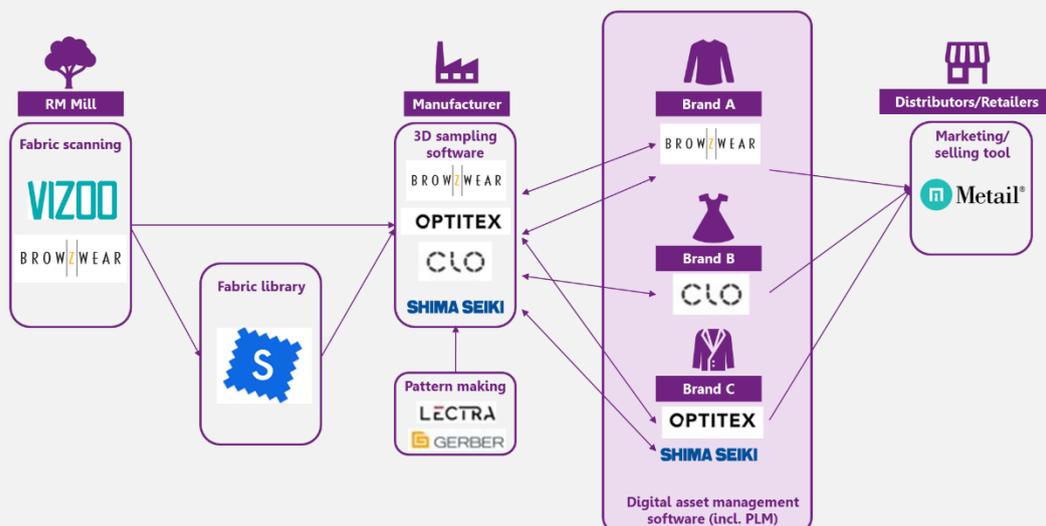


Pro Tips!

Successful 3D adoption is a “two way street” – both upstream and down stream players need to partner up in order to unlock 3D benefits. Brands need to be sensitive to the apparent benefits asymmetry when working with finished goods and/or raw material suppliers. If possible and appropriate, they could provide support (financial and/or non-financial) to their upstream partners to incentivise them to adopt 3D use cases. Without upstream support, it would be much more costly and slower to scale 3D use cases.

Illustration 2.5 – 3D tools ecosystem across fashion and apparel value chain

Example: an apparel brand offering both woven and knit garments will have to deploy two 3D tools namely CLO/Browzwear (for woven) and Shima Seiki (for knits).



Key considerations for successful 3D adoption

Organisations should be focused on mitigating risks highlighted in the previous section. In order to assist business adoption 3D, Weave proposes the following 5-stage approach to business transformation:

Illustration 3.0 – Staged approach to accelerate 3D adoption

	Don't start with technology, start with a business need	Find a business problem that the organisation genuinely needs to address	Define value and engineer quick wins, speaking openly on challenges	Get the right people on board – pick a passionate talent to lead
	Start small and take iterative customer feedback loops	Lock down the process, adjusting as you go with customer feedback loops	Co-create solutions with teams through workshops & engagement sessions	
	Build capabilities from within, empowering teams with accountability	Redesign KPIs to ensure functions are aligned on 3D benefits & have a common goal	Empower people along the 3D journey with clear roles & responsibilities	Invest in 3D skills internally by allocating time & look outside for best in class training
	Set realistic, achievable timelines & expectations for implementation	Adopt Agile as a standard way of working	Ensure the technology fits across all business applications	
	Create excitement using executive sponsors to scale	Allocate KPIs to C-level to bring partners on board through incentives, not punitive	Create consistent messages for leaders and encourage 2-way communications with teams	

Don't start with technology, start with a business need

Find a business problem that the organisation genuinely needs to address

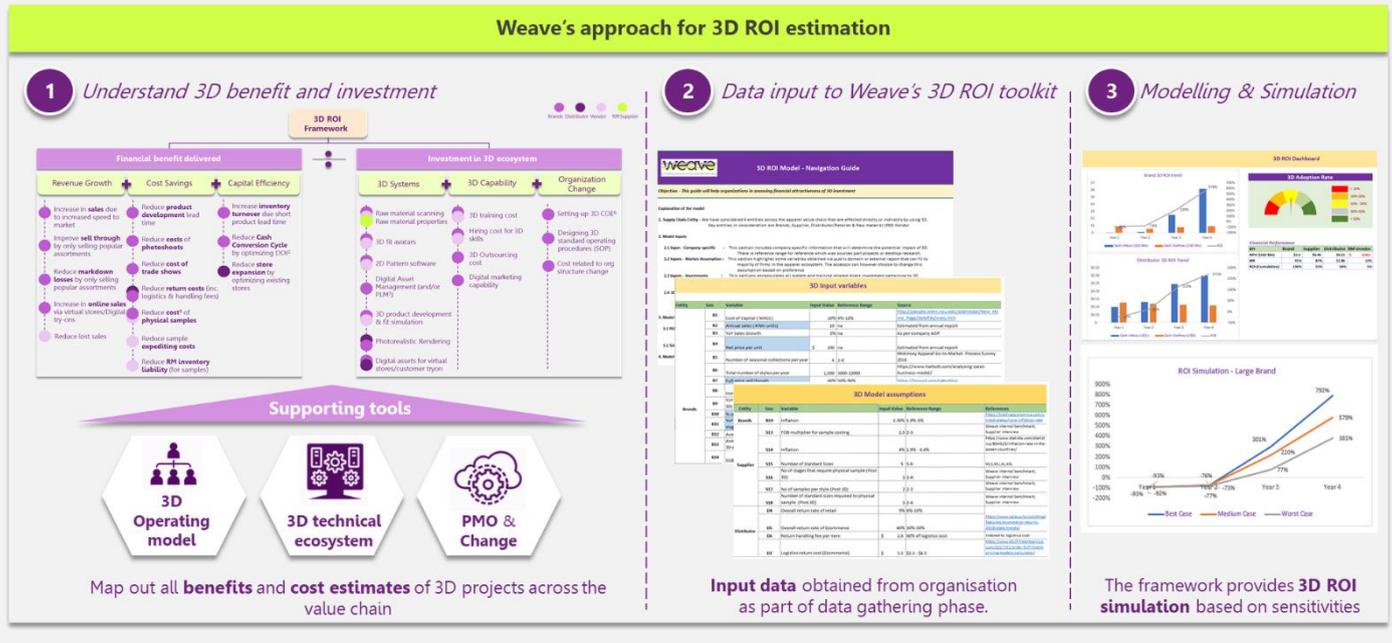
- There has to be a genuine business need that the organisation would like to solve. Business leaders should be reminded that not all the problems require a digital solution – avoid falling into a trap of “keeping up with the Jones”, its timely and costly.
- ROI models and benefits tracking needs to be a core skill of the project team.
- The business case should highlight high level ROI involving all benefits and model the impact across the ecosystem. Two-thirds of respondents in the Weave 3D survey cited limited use of ROI or using soft KPIs such as speed, lead time, inventory turns, to measure 3D benefits.
- Organisations who are adopting 3D for long term gains should develop a robust ROI model with quantifiable benefits. The model can be built using reasonable assumptions and forecasted data.

- Weave has created a toolkit to help brands and manufacturers build business cases, through ROI modelling, simulation and sensitivity analyses (Illustration 3.1).

Define value and engineer quick wins, speaking openly on challenges

- Based on ROI and investment appetite, fashion and apparel brands can plan for use cases that will deliver quick wins during the initial adoption phase. Organisations should map various 3D use cases across the fashion and apparel value chain to identify areas to initiate 3D adoption (Illustration 3.2).
- Establish what success looks like with the team and obtain a clear vision for the future. Companies with clear change story for transformation are 3 times more likely to report successful digital transformation⁷.
- Speak openly with troubling issues. No change project is smooth, but ensuring that you are communicating wins and losses builds trust with teams, enables outsiders to engage in the problem solving and make the technology work for your business.

Illustration 3.1 – 3D ROI toolkit developed for fashion and apparel supply chain players



Get the right people on board – pick a passionate talent to lead

- 70% of all respondents say their organisations perform well during transformation when a leader familiar with digital technologies joins the management team and communicates their passion for digital transformation⁷.
- Communications and framing in the right way are crucial to getting the stakeholder on board – 52% of respondents cited push back from operations team due to lack of clear information on the implications of 3D.
- Since 3D process span across multiple functions, ranging from brand, design, sourcing and sales & marketing, communication should be organised to gather different opinion on current challenges and how 3D could help. Addressing key departments' concerns will ensure widespread success of 3D.
- The setup of project team will determine success of the transformation, companies should ensure initial team members driving 3D change are truly passionate about 3D and have capacity to commit time and energy to the project.

Start small and take iterative customer feedback loops

Lock down the process, adjusting as you go with customer feedback loops

- Start with a small scope and low complexity (e.g. carry-over styles, simple garment categories, etc.), and gradually increase the scope and complexity as you build momentum. Ensure stakeholder alignment to process change through iterative feedback loops.
- Understand your big challenges and unknowns (e.g. complex garment categories, high quality visualisation

for e-commerce) and start work early to tackle them through demonstrators. In agile development these are known as "spike solutions". But do not put spikes on the delivery path.

Co-create solutions with teams through workshops & engagement sessions

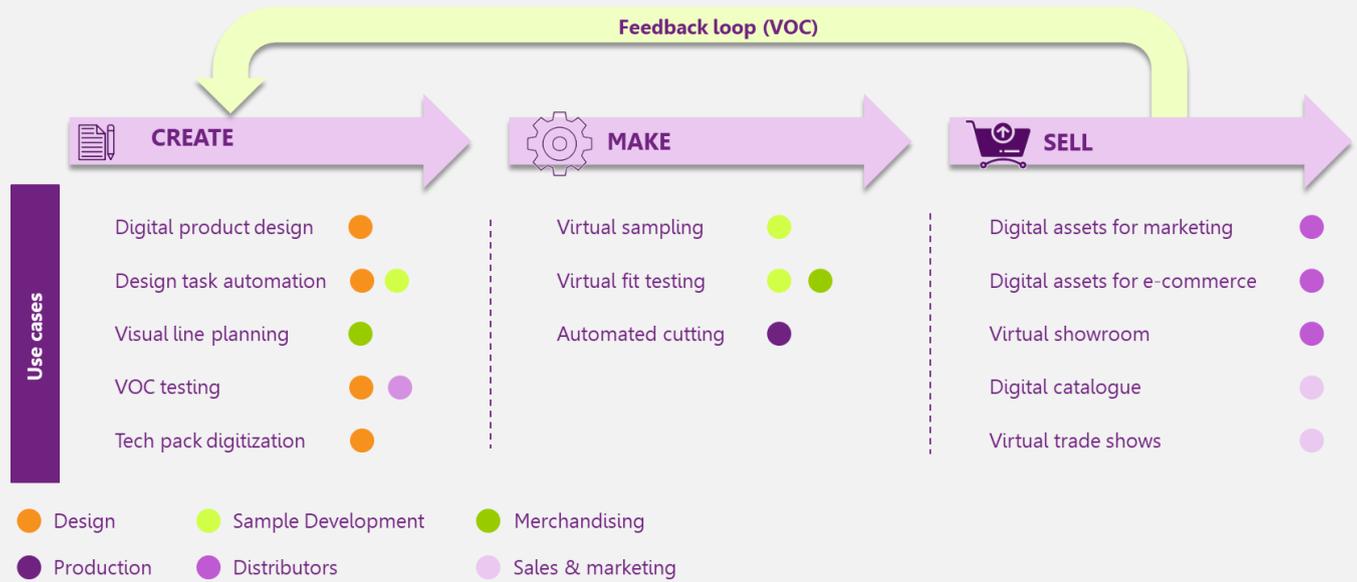
- Change is easier to mobilise if the solution is co-created with the user. A co-creation approach (workshop, group surveys, brainstorming, etc.) can be used to build alignment across different team members. This approach can also unlock the creativity to find the "different but better" ways to exploit 3D, and generate quick wins. During the co-creation process, define clear roles and responsibilities to ensure ownership.
- Strong project management, KPI tracking and governance processes should be put in place to ensure accountability and ownership of timelines and milestones.

Build capabilities from within, empowering teams with accountability

Redesign KPIs to ensure functions are aligned on 3D benefits & have a common goal

- It is key to understand that different 3D virtualisation use cases bring different level of benefits to different stakeholders – thus benefits may be asymmetric depending on use case.
- Furthermore, as it is common for functional teams to have different objectives and metrics, team objectives may need to be redefined to ensure alignment towards a common goal.
- This can be well achieved by re-designing both functional metrics and individual KPIs to foster cross-functional collaboration.

Illustration 3.2 – 3D use cases available for different supply chain partners



Empower people along the 3D journey

- Temperature checks on POC teams should be regularly conducted to ensure that the teams feel ownership, accountability and are prepared to make the project a success.
- Change management regime should be transparent with periodic update on both progress and risk. Create change working groups for teams by teams to ensure that all key issues are brought to management and can be resolved quickly. Empower influential team members as leads in this process.

3D operational skills to be developed internally or hired externally

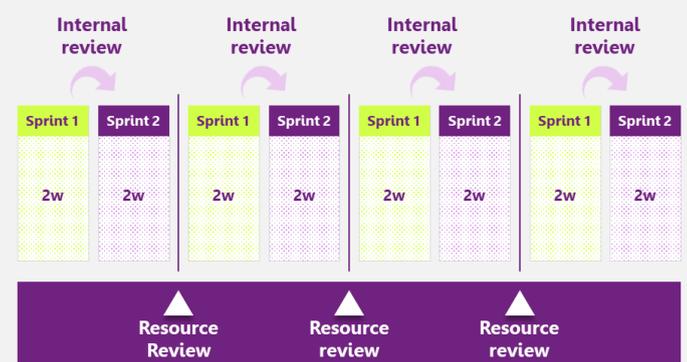
- The strategic choice of internal vs external hire is also needed to ensure 3D projects are on schedule to achieve the desired outcome of the transformation.
- Skills assessments should be conducted organisation-wide to identify hard and soft skills needed in the transformation journey. There are skills that will be required in the short term (e.g. set up of software and data architecture) and some for the long term (e.g. 3D design capability). External resources can be considered in the short term at the start of the transformation, but studies have found that engaging and upskilling internal talent should be preferred, as doing so can boost engagement by up to 30%¹⁰.
- Growing skills from within is the secret sauce to gain widespread adoption within your teams. Look deep within your teams and identify people who would enjoy learning and free up their time to nurture this knowledge – the time must be on company time and with company resources.
- In general, companies should help relevant teams prioritise on-the-job training in the form of dedicated training session and time allocated, rather than relying on teams to learn in their personal time, which results in teams giving low priority to the 3D project.

Set realistic, achievable timelines & expectations for implementation

Adopt Agile as a standard way of working

- Although “Agile” is a frequently used buzzword, used by different people to mean different things, there is a key Agile concept that companies on a change journey should look to adopt: iterative short-term adjustments to allow teams to reset and re-prioritise their work, to ensure that the change is best suited for the business.
- Agile methodology refers to an iterative project management approach in which objectives are broken down into multiple bite-sized stages (called “sprints”), each of which aims to achieve a tangible outcome or deliverable that builds towards the final intended business objective (Illustration 3.3).
- Each “sprint” can vary in length, typically between 1 and 4 weeks depending on the product/service, starting off with a planning phase and ending with a review phase. This allows teams to experiment and learn quickly within each “sprint”, and use learnings from previous “sprints” to improve future “sprints”.

Illustration 3.3 – Example of Agile sprint timeline



Ensure the technology fits across all business applications

- The 3D technology landscape is complicated with different functionalities available in different tools. It is important for companies to discuss with multiple vendors and conduct a thorough evaluation before selecting 3D tools.
- Organisations may choose to work closely with a system integrators and other technology partners to define the 3D technical architecture that fits current and future use cases (Illustration 3.2). The choice of tools can be incremental with one set tool selected for certain categories or business line. For example, RomansCAD and MODO for footwear, and Browzwear, CLO and Optitex for apparel.
- Illustration 3.4 shows a practical case study of how of industry leaders have successfully overcome the process and technology complexities related to 3D adoption through partnering with a leading 3D technology provider.
- Ensure the technology cost, including integration and licensing, is correctly defined in the 3D ROI model to arrive at the right ROI estimate.
- 50% interviewees emphasised the importance of compatibility and interoperability between 3D tools and the flexibility to add new features in the future upgrade. As the technology evolves, it is expected more partnerships will be formed amongst different software companies to aid this.

Illustration 3.4 – Practical case study from a leading sportswear brand

PUMA's successful 3D virtualisation of their Sportstyle category

A lesson in iterating towards a clear business need with Browzwear and EcoShot

In July 2020, PUMA released a case study¹¹ describing their 3D product virtualisation experience. In this section we examine the case study from the lens of this whitepaper's Key Takeaways to see how they helped PUMA's success.

Don't start with technology, start with a business need

- In PUMA's case, this was to improve decision making and tackle their complex approval process
- They recognised this would require a means of improving communication and coordination between their teams which were globally distributed

Start small and take iterative customer feedback loops

- PUMA initially started small in 2017 with their Hong Kong based Development team but ensured they had sufficient training resource to embed the tools
- This success led to PUMA's designers in Germany adopting 3D tools themselves
- When these teams discovered that adoption of 3D virtualisation was being hindered by the quality of visualisations, they began experimenting with higher quality garment-on-model visualisations in 2019 with Metail's EcoShot technology
- PUMA's agile approach meant that they learnt how higher quality visualisations would build greater trust in 3D amongst their other stakeholders and also facilitate greater decision making without the need for physical samples

Build capabilities from within, empowering project teams with accountability

- PUMA first prioritised building 3D capabilities within their own teams before then extending to onboarding vendors too

Set realistic, achievable timelines and expectations for implementation

- Adopting 3D virtualisation has required over 3 years so far at PUMA which gives an indication of the timescales involved in creating a successful 3D foundation

Create excitement using executive sponsors to scale

- Sponsorship from PUMA's Chief Sourcing Officer has been key to maintaining momentum throughout this period

"Browzwear have always been extremely helpful for finding valuable and practical ways to implement 3D into our business processes. This helped us gain a much faster decision making pace during our product creation resulting in quicker time to market." Bernd Sauer, Director, Development Apparel & Accessories, Puma





Create excitement using executive sponsors to scale

Allocate KPIs to C-level to bring partners on board through incentives, not punitive

- Additional benefits and synergies of 3D virtualisation can be unlocked if both the upstream and downstream value chain partners also adopt and share digital processes and assets.
- Brands and retailers, who are currently driving most 3D initiatives, should engage and support upstream partners (e.g. final goods and raw material suppliers) during the pilot stage by sharing expertise and skills to support them to accelerate the adoption process.
- Final goods and raw material suppliers should also consider adopting a more strategic mindset and be open to forge long-term partnerships (and not just transactional relationship) with brands and retailers through supporting them on 3D initiatives.

- Since 3D is a transformative topic that requires the business to be up-to-date on latest development and how other businesses are adopting it. Decision makers need to be aware of and accountable for benefits relating to partnership engagement, through ownership of KPIs.

Create consistent messages for leaders and encourage 2-way communications with teams

- Executive-level sponsorship is key to 3D adoption success, thus the success of the POC should be celebrated and communicated with the leadership. A recent study highlighted that 46% of managers believe that lack of executive sponsorship or buy-in is a major barrier to digital transformation¹².
- A clear business case needs to be created to justify ROI of scaling 3D use cases across the organisation, through scenario planning and simulation. This holistic analysis should consider all benefit areas, including revenue gain, cost savings, and efficiency improvement.



Key Takeaways



Don't start with technology, start with a business need; create use cases where it will unlock a current unmet business need, then substantiate with a quantified ROI model (included)



Start small and take iterative customer feedback loops; lock down process, but still allow adjustments through customer feedback loops enabled by co-creation workshops and engagement sessions



Build capabilities from within, empowering project teams with accountability; dedicate time for critical operational talents to come to terms with 3D and provide ways to tailor it to your business



Set realistic, achievable timelines and expectations for implementation; changing a business model is difficult, adopting agile ways of working will enable pilot teams to adapt and adjust in situ



Create excitement using executive sponsors to scale; with value chain partners and internally, scaling requires top management to own and drive KPIs relating to partnership engagement

Brands will be left behind if they do not initiate 3D adoption now to stay competitive and relevant in the new dawn of fashion

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How Weave can help you

Weave provides a holistic approach to help you set a digital target operating model – taking into account your strategy, setting up a clear business case and managing changing



STRATEGY

Digital New Product Development implementation - from pilot to scale up, customer journey analysis



BUSINESS CASE

ROI framework and business case development, RFI-RFQ process



ROBOTIC PROCESS AUTOMATION

Process design, re-engineering and automation



CHANGE MANAGEMENT

Organisation design, roadmap and transition management

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