Fashion in transition:
The new digital workflow

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Preface

The 3D design path I took started with the minor 3D Hypercraft at the Amsterdam Fashion Institute (AMFI). Within this minor the main objective was to learn working with 3D virtual prototyping (3DVP) software. I was able to use Lectra Modaris and CLO 3D. This new way of designing and developing a garment was totally new for me and it was eye-opening to see what the options and possibilities were. With the instructions and lessons given by the teachers at AMFI were my classmates and I able to construct new design methods and created actual designs retrieved from the 3D insight. The ability to experiment with creating garments in a playful way and being able to play around with the program were key factors for me really dive deeper into this subject.

After the minor, I got the opportunity to do my internship at Peak Performance. During my time there the head of production asked me to do a small 3D design project within the production and design team, after I showed the teams what I did in my previous semester. I was asked to re-create two existing styles in 3D to showcase this to the teams. There was a lot of positive feedback, and of course, others who still had some doubts about the possibilities of 3D virtual prototyping software. The ones who doubted mentioned that the 3D outcome did not express well enough their design thoughts (real-life rendering), or that this new type of workflow did not work for them since it was too time consuming. They did not see the relevancy compared to the ‘older’ working methods.

That small group of designers and developers not (yet) seeing the relevancy of the possibilities of 3D virtual prototyping software got me thinking about what new developments are happening currently in the industry and what the relevancy of 3D virtual prototyping actually is. The people that I spoke with, who already knew 3D software, were all very enthusiastic. So, why are there still people feeling reluctant towards working with a new digital workflow that could possibly benefit them, I asked myself.

Now, there are several new technologies that have arisen the last couple of years. In such a rapid pace technology is updated, almost every day. I wanted to know how the fashion industry could adapt to these new technologies. This was the start for me to dive deeper into the connection between fashion’s workflow and technology developments, with the connection currently being The Fourth Industrial Revolution.

I found that Industry 4.0 and the technologies that have arisen and arise from it could truly benefit the fashion industry, especially the use of 3D virtual prototyping. This 3D software has been used by the industry for several years now, with the software provided by several suppliers. Wanting to know what fashion companies and professionals should and can do to adapt to this new revolution and how it can benefit their current workflow.
Abstract

Industry 4.0 has already quite a severe impact on the fashion industry. This new industrial revolution does not only have its effect on industrial level but also on social level. The technical developments are following up in such a rapid pace that the social aspect needs to be taken into account. People tend to need a longer transition period to adjust compared to technical developments.

The usage of 3D virtual prototyping software is a major component arising from Industry 4.0 that has the biggest influence on the industry up until this point. Several bigger fashion companies, such as Nike and PVH, are experimenting with this new workflow and have shown to be more agile and time efficient.

When making the transition to a new digital workflow challenges have to be met and overcome. Fashion professionals have to learn to work in a 3D environment and to translate their 2D sketches into a 3D digital garments. Change management and time to learn and adapt are needed to help the professionals or teams to be able to create a new workflow within the company that suits them best. When knowing what 3DVP software is and what it can do, the first step to take is focusing on the companies’ business process and to understand where 3DVP can help the company or team.

Several software suppliers offer 3D virtual prototyping software. The suppliers offer tailor-made products and serious hardware is required to run the software smoothly. The suppliers have to be contacted individually to truly understand what their specific software can do for your business process. Having pattern making knowledge is a key skill to be able to work with 3DVP software and having an open-mindset towards a 3D workflow is even more relevant. End-to-end implementation of 3D garments enables the whole company to have a direct line from design to end-consumer, with the ability to speed up processes.

For someone that is interested in 3DVP and would like to know more it is rather hard to find information easily. Suppliers have to be contacted individually to receive more in-depth information. To really create a new standardized digital workflow and to set the transition in motion it is key to inform industry wide on a basic level what 3DVP is and what the possibilities are.
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Introduction

The world is currently in the middle of the Fourth Industrial Revolution (Industry 4.0). The industry 4.0 will affect the fundamentals how we work and live on a daily basis. (Schwab, The Fourth Industrial Revolution: what it means, how to respond, 2016) Industry 4.0 can be also be seen as next level digitally enabled lean. The lean methods, such as reducing waste by using machines and the development of computer calculation strength, can be used by companies to optimize their technical systems, people systems and management systems. (Behrendt, Müller, Odenwälder, & Schmitz, 2017) Quick and fierce technical development was key in the industrial revolutions that preceded Industry 4.0. The exponentially growth demands sustainable system solutions. Both on social and technological innovation level, not just only on the technological level. (Morrar, Arman, & Mousa, 2017) Industry 4.0 will have a major impact and create changes in working operations as we have seen in the preceded industrial revolutions. And with the fastness it develops itself also comes higher costs. When a new standard is introduced it might already be re-developed simultaneously. (Sawa, 2018) Fashion companies need to start experimenting now with new technologies in order to be relevant and to keep up with the pace of the rapidly evolving technology possibilities. In order to keep going forward is experimentation key to be able to use the new technologies coming forth out of Industry 4.0. (Schwab, Four ways to win the fourth industrial revolution, 2018)

Forthcoming of the Fourth Industrial Revolution are 3D printing, 3D virtual prototyping and the use of AI some of the key elements fashion companies could be working with. It will take some trial and error to find a sweet spot working with 3D virtual prototyping software. And as said by Papahristou & Bilalis, the technology is happening now and not in the future, reality and virtuality will be merging more and more (Papahristou & Bilalis, Can 3D virtual prototype conquer the apparel industry?, 2016).

Artificial Intelligence software could enhance 3D virtual prototyping software. AI could for instance adjust automatically patterns and instantly realizing the changes in the 3D software. (The Future of Fashion, 2018). 3D virtual prototyping software gets developed in a rapid pace, while not a lot of fashion companies have adapted to this new way of working. As Papahristou & Bilalis stated, 3D virtual prototyping is now and here to stay (Papahristou & Bilalis, Can 3D virtual prototype conquer the apparel industry?, 2016). Still, we see a lot of brands, and thus people, being reluctant to adapt to these new technologic developments. CLO 3D director of operations Daniel Seo stated in 2018 that 3D is still being seen as a gimmick (Seo, 2018). Also, in the industry itself it appears to be that this development is a big hurdle (Abnett, 2016), while for many years 3D software has already been used in architecture, automotive and aerospace (3D-Innovations, 2013), and the research on 3D virtual prototyping can be traced back in literature to the year 2000 (Volino & Magnenat-Thalmann, 2000).

Anybody who would like to start with 3D design should be able to get easy access to information. With off the record talks with people from the fashion industry they stated that they find it hard to find basic information regarding 3DVP.
The questions and structure

How can fashion professionals and companies prepare for the implementation of technologies coming forth of Industry 4.0 with a focus on 3D Virtual prototyping to develop garments?

What are the key elements that fashion professionals and companies should prepare for when implementing 3D virtual prototyping software? The following questions were researched to create a better understanding of what Industry 4.0 is, what kind of influence it has on the fashion industry and how fashion professionals and companies could adapt to this new way of working.

How does Industry 4.0 influence the fashion industry?

This chapter starts with an introduction to Industry 4.0 and will continue with an analyse of the obtained information how Industry 4.0 has influenced the fashion industry. The chapter will be concluded on how Industry 4.0 and the fashion industry are inter-twined.

How are designers/developers cooping and adapting to the changes coming forth of the Fourth Industrial Revolution?

The gathered information will be explained by an introduction of the companies/people I have spoken with. Several key statements and findings will be stated separately. Afterwards, the statements and findings have been compared to see what the correlation is. The correlation created the base for the conclusion of the sub question.

What are the limitations and potentials when making the transition 3D Virtual prototyping?

To answer this sub question, gathered information from the case studies and interviews are stated clear and unbiased. The outcomes have been compared to see where there is any overlap and thus creating the concluded limitations and possibilities.

What tools and skill sets are required for fashion professionals and companies to make the transition working with 3D virtual prototyping software in the design and development department?

In order to answer this sub question it is important to state limitations of the tools (software). Afterwards, findings are stated, and secondary data was compared with primary data to conclude the sub-question with an overview of the required tools and the required skill set needed.

Conclusion, limitations and future work

This chapter concludes the research report by stating the findings of the sub questions and gives in its totality answer to the main research question. The limitations will express the boundaries of the research report. Future work focusses on the aim of future research.
Methodology

The methodology that has been used to collect the data faced multiple disciplines. The gathered data and information were conducted from professionals to gain realistic and relevant data and information. These professionals are representatives from the fashion industry and fashion related universities. The different methodologies chosen for the following questions are qualitative and quantitative to make this research as reliable as possible.

Literature review was the methodology used to answer the first question. To know how Industry 4.0 has influenced the fashion industry information was gathered about what Industry 4.0 exactly means. The conducted data was found in literature and the relevancy of this topic was researched by gathering descriptive research from journals and articles.

When researching the second question literature research, interviewing professionals and process of observations were the used methodologies. The information for this sub-question was gathered by speaking with several professionals from the industry, designers but also managers and teachers. The companies that these people work for range from PixelPool to PVH, AMFI and CLO 3D. Since the point of view of people can be biased, secondary research was conducted to balance opinions with scientific studies how companies/persons react to change in their daily work life.

The third question was answered by using literature review, interviewing professionals and case study research as the methodology. To identify the limitations and potentials case studying fashion companies who have implemented working with 3D virtual prototyping was done. By doing desk research, researching articles about companies making the transition and conducting interviews with professionals who have made, or created for clients, the transition. In the end the secondary data was compared with the primary data to create a clear overview of what the limitations and potentials are.

The used methodology for the last question was a questionnaire, interviewing professionals and process of observations. The data for the tools subject were gathered by researching the software companies’ websites. The suppliers researched were chosen because of those specific suppliers being named within lectures at AMFI and were the most mentioned by the professionals who have been interviewed for this research report. Since there are a more suppliers available the intention was to focus on the noted suppliers. Intentionally the data was researched as a layman to get clear insight how easy information can be accessed. The skills were gathered by extracting the interviews to pin-point their observations with the combination of a questionnaire done by the 3D designers from PixelPool.
1.1 The Industrial Revolutions

The fashion industry is heading towards a major change in its current workflow, which makes it necessary to understand why using, and adapting to, new technology is relevant for fashion professionals. It is not that the fashion world alone is rapidly changing in the way they operate, it is happening in all sorts of industries. Industry 4.0 stands for the fourth time a major technology change has taken place on a worldwide scale and it elaborates the scale of the influences the technological improvements have on our day to day work and personal life. Every industrial revolution has had a major impact on both the world and the fashion industry, especially Industry 2.0 and 3.0. To understand why Industry 4.0 has a major impact on the fashion industry and its professionals an overview how Industry 4.0 and its technological improvements impact the current workflow is tried to be created. The industrial revolution, according to (Cambridge Dictionary, n.d.), means: “Any period of time during which there is a lot of growth in industry or particular industry”. This directly implies that every industrial revolution has known considerable growth within that time period for a (particular) industry. Industry 4.0 originated in Germany, at the company Bosch in 2011 at the Hannover Trade Fair (Löffler & Tschiesner, 2013). Although the technology driving Industry 4.0 can be traced back to 1999 with The Internet of Things (Foote, 2016). Industry 4.0 is expected to have again a major impact on today’s society. In order to understand what the impact of Industry 4.0 will be, must we understand what the precedent Industrial Revolutions meant.

Industry 1.0 has its origin in Great Britain, 1800’s. Steam and water-powered machines were invented to aid and elevate industrial production productivity (Crandall, 2017). The second industrial revolution, 1870-1914, is characterized by the usage of electricity and the invention of technology driven by electricity for mass production (Mokyr, 1998). Revolution number three is mostly known for the rise of the internet and the use of automated production created with ICT systems. (Sheth, 2019). The revolutions have had a severe positive impact on the world economy.

1.1.1 The technology driving Industry 4.0

Industry 4.0 enhances 3.0 with a new synergy level of computer systems, automation and blurring the lines between physical and digital (Schwab, The Fourth Industrial Revolution: what it means, how to respond, 2016). Manufacturing in fashion is rapidly changing by the usage of 3D printing technologies, for example the 3D dress from Uniqlo (Segura, 2018), 3D printed shoes from Adidas and 3D print company Carbon (BI SA, 2018) and 3D virtual development tools. With these new technologies, which re-evaluates itself continuously, it is crucial for companies to start experimenting now (Sawa, 2018). Raped growth and technological breakthroughs increase the difficulty to keep up with learning new skills, while having simultaneously an extensive effect
on social level (Morar, Arman, & Mousa, 2017). Companies will have to be ready to incorporate learning programs for their personnel to keep up with their fast-changing workflow. (Renjen, 2018)

The transition from working with paper patterns to working with 2D CAD/CAM programs, such as Lectra, is a good example of a completely changed workflow. (3D-Innovations, 2013) Meaning that professionals will most likely have to change their current workflow, which has maintained the same for almost over a decade now. Change management within a company is needed to create the correct learning curve for their personnel to learn the new skill sets fluently.

1.2 The influence of technology arising from Industry 4.0

Industry 4.0 is characterised by several key elements that have influence on a world-wide scale, not just locally where a specific software or technology is developed, it spreads out quickly within the digital world. Now, since it is not reasonable to try to understand them all, the focus will be on key elements that influence the fashion industry on the design and development level. Industry 4.0 in fashion is identified by the usage AI, 3D virtual prototyping (3DVP) and 3D printing (Abnett, 2016). In the design process of 3DVP do several digital workflow structures arise incorporating the technologies into current non-3D workflows.

The Fabricant, together with Amber Jae Slooten, is pioneering in digital fashion. The project DEEP – Faster fashion by Amber Jae Slooten shows how AI can enhance the creative design process (Slooten, 2018). The software algorithms, provided by (The Asimov Institute, n.d.), created from several catwalk pictures are shown in Figure 1.1. New outfit pictures which

![Figure 1.1: Catwalk photos used by Slooten for AI rendering](source)

![Figure 1.2: Design output by Slooten of AI rendered photos](source)
were translated by Slooten to 3D virtual prototyped garments. Shown in Figure 1.2 is one of the rendered 3D garments by Amber Jae Slooten. Slooten combined AI software to collect design ideas and used the digital prototyping software CLO to create a totally digital collection.

3DVP is progressively more used in the fashion industry (Papahristou & Bilalis, Can 3D virtual prototype conquer the apparel industry?, 2016) by brands such as Adidas (Stolzenberg, 2017), Nike (SgT Group, 2017) and Tommy Hilfiger (Carey, Tommy Hilfiger wants to become a software company, 2018). The usage of 3D Virtual Prototyping at Tommy Hilfiger within the current workflow of the company, is what start-up company Stitch from PVH is focused on. Stitch works together with mainly Browzwear to develop add-ons to the existing software to integrate design tools into the current workflow. The ultimate aim, as said by Marlies Reukers (appendix 1), 3D Design training & Transformation specialist at Stitch PVH (Reukers, 2019), is to have a fully developed digital design workflow where the pattern is created digitally until the selling of the garments in a digital showroom. With minimizing the physical samples to set the perfect synergy together with digital samples. PixelPool is a company who started to work with Nike to create hyper-realistic digital samples of their garments to incorporate into their marketing tools. Where Stitch its focus is on implementing 3DVP into a company’s workflow is the focus for PixelPool to create a full digital service where a brand can send specific elements to PixelPool to be translated into a digital virtual garment or environment such as a visual merchandising application is the key objective, as said by Cas van Lier (Van Lier, 2019), Marketings and Communications specialist at PixelPool (see appendix 2).

1.3 The influence of Industry 4.0
Every industrial revolution had a major impact on both industrial and social level. All these changes that were happening had an impact on the behavior and social aspect of humans adapting to these new changes. New workflows were created, and several working methods changed completely. 3DVP currently the most sought-after digital enhancement to create a faster and leaner workflow. Wealthy fashion conglomerates started several years ago experimenting with this, which enabled them to set a new structure to work more efficient, both on time and resources. The influence of technologies coming forth of Industry 4.0 is big and undeniable and fashion companies should start working and experimenting with 3D digital workflows to stay relevant and agile in the future.
Adapting to the technologies arising from Industry 4.0

2.1 Changing the workflow

In chapter two concluded is that the impact of Industry 4.0 is visible on both industrial and social level. 3DVP plays a major part in this revolution in the fashion industry and has the biggest impact on fashion companies on the design and production level. Designers and developers who are currently working in the fashion industry have a globally acknowledged workflow. What are these changes and what do the designers and developers experience?

To start of this chapter, a quote from Klaus Schwab highlights the impact of this revolution on our lives:

“One of the features of this Fourth Industrial Revolution is that it doesn’t change what we are doing, but it changes us.” - Klaus Schwab, Founder World Economic Forum, Annual meeting conference WEF, 2017

2.2 The old system

Since Industry 3.0, designing in CAD systems, like Adobe Illustrator, are the standard in the fashion industry. Flat sketches are drawn digitally with as much detail as possible or designers create their own drawn sketches as a creative outlet for their ideas. Figure 2.1 shows the 2D drawn garment sketch created in Adobe Illustrator. The flat sketch compared to the real garment, the real garment showed in Figure 2.2, looks correct, but the sketch can be interpreted differently, noticed Marlies Reukers when shown the pictures. These kinds of sketches are used by the industry to send out to factories as a reference with the pattern how a style should look like. The translation, from sketch to complete selling sample, from designer to manufacturer, can take a very long time. This results in several prototype and/or samples, especially with new styles, which can go up to as high as 8 samples per style (Sampling Process in Apparel Industry, 2018).
2.3 The digital system

3DVP software, such as (CLO, 2019) and (Browzwear, 2019), offer a digital environment where designers and developers can simultaneously create a 2D pattern, stitch and drape the fabric around the avatar. Working in a 3D environment requires a different skill set. Shown in Figure 2.3 is the 3D digital rendered image of a jacket created in CLO 3D. Figure 2.4 shows the real-life jacket that was created with the same patterns. A 3D rendered picture does almost leave no room for interpretation opposed to the 2D sketch. The fabric drape, color composition, stitches and fit show instantly on a personalised fitting avatar.

Designers and developers first have to adapt to working with new software, while simultaneously working with the old software. Sandra Kuijpers, 3D teacher at AMFI (Kuijpers, 2019) said (appendix 3) that in order to learn the new software time and persistence is needed to develop the newly required skills. Full commitment to develop 3D strategies, end-to-end thinking is necessary, said Joshua Young, 3D Digital transformation leader (Young, 2019) in his Webinar about on-boarding 3D. When having the digital system in place, the company could benefit in multiple departments, like the marketing or sales department, to implement the digital rendered garments. But there is still a lot of persistence from both designers and management to start working with 3DVP, as said by all interviewees (appendix 1-2-3-4-5-6). Daniel (Seo, 2018), Director of Operations CLO 3D also acknowledged this subject in an open letter to the fashion industry by stating that 3D is still being seen as a gimmick to some. While other industries, like the Automotive, have fully adopted this new way of working. CLO 3D Designer Manuel (appendix 4) expressed that the younger people are the easier they adapt to working with 3DVP. Moreover, he also noticed from own experience that people are more willing to work with 3DVP when they have already more interest working digitally.
2.4 The transition

Joshua (Young, 2019) stated in his webinar that for a company to create movement towards 3D implementation starting with focussing on business process is important. Identify what your team or company needs, and research accordingly which tools and software will benefit this process. Engage leaders and management to create real movement within the company and think in end-to-end solutions, from design to sales.

The biggest challenges the designers and developers face when making the transition to a new digital workflow is to learn how to work in 3D software and translate ideas into a 3D model, as said by Cas van Lier (see appendix 2), and Manuel (see appendix 4), 3D designer at CLO 3D (Manuel, 2019). The fashion industry is working for several decades now with 2D CAD programs and it requires a new skill-set and the willingness to change from the employees to work with 3D software (Papahrístou & Bilalis, Can 3D virtual prototype conquer the apparel industry?, 2016). Industries like the automotive and aerospace have engineering as their core, which helps translating 2D to 3D. Change management to understand how to make the physical transition on a social level is needed (Basford & Schaninger, 2016).

For a successful implementation of a new workflow it is needed to rely on the employees (Lucidchart content team, 2018). Also expressed by Joshua (Young, 2019) with change management it is important to show that everyone gains new skills and will be more efficient with their time spend on development. This in return will motivate the team towards the new goal. A representation of the ADKAR model is shown in Figure 2.5. The ADKAR model shows how change can be implemented in the organisation.

Figure 2.5: ADKAR model visualised

The ADKAR model is a tool to set the correct change flow on the work floor. It will help management to set the right conditions for a lean transition to a new digital workflow. (What is change management and how does it work?, n.d.). It helps when people are intrinsically motivated to work with 3D, said Marlies Reukers. Stitch, is intentionally set up like a start-up company to create a cool vibe around the company. This makes people more willing to work with the new digital software even when they are reluctant in the beginning.
Making the transition: the potentials and limitations

3.1 Looking at both aspects
When making the transition to a new digital workflow with 3DVP the conclusion from the previous chapters is that the transition must be made on both industrial and social level. The two most important aspects from the previous chapter have been researched more in-depth in this chapter: the software used by the fashion industry to create a digital workflow and the social aspect when making the transition. Change management is something that needs to happen on the work floor, but it is key to understand what needs to be changed. Limitations and possibilities will be compared to get a representation of what is needed to create the transition.

3.2 The software implementation
There are several software suppliers who offer 3DVP software. CLO 3D (CLO, 2019), Lectra Modaris (Lectra, 2019), Browzwear VStitcher (VStitcher, Browzwear, 2019) and Opitex (Opitex, 2019) are mainly mentioned by professionals and teachers from the fashion industry. This directly is both a limitation and a potential. When a person or company is researching the possible options to work with 3DVP software, they can find a lot of companies which offer 3DVP software. It is time consuming to figure out which company fits best to the needs of the seeker. For instance, Adobe is now the industry standard concerning 2D designing, while concerning 3D several key players are used by multiple fashion brands. There is no standard software supplier for 3DVP. On the other hand, because of the fact that there are several players in the market, the companies can be chosen to fit exactly to the needs of the seeker. Where Adobe is a 'one for all' software package, 3DVP software companies can be chosen for their specific abilities.

Stitch uses both CLO 3D and Browzwear VStitcher. These two programs offer 2D patterning and 3DVP in one software package (Reukers, 2019). Browzwear VStitcher is mainly used by Stitch because of the ability within the software to add tools that allow Stitch to further enhance the software and tailor the software to their own needs with in-house software developers. Stitch is purely focused on the implementation of 3DVP into the workflow of PVH, which enables them to set up a whole team fully dedicated to that purpose. Now, for a smaller company that might be hard to achieve.

A starting company or person could benefit from having a complete software package which enables them to create a digital workflow by themselves. CLO 3D is mainly used by PixelPool, as told by Cas van Lier (see appendix 2). The easiness with which CLO 3D transitions the 3D stitched patterns to 3D simulation software such as Marvelous Designer (Marvelous Designer, 2019), is key for PixelPool, who focusses mainly on virtual sampling (PixelPool Virtual Samples, 2019) and 3D visualisation (PixelPool 3D retail visualisation, 2019).
3.2.1 The library
Set up your own online libraries with fabric swatches, colours, stitching and trimmings, was expressed by both Marlies (Reukers, 2019) and Joshua (Young, 2019). This enables the team to easily adjust basic blocks or gives the ability to create new styles with only a few clicks.

3.2.2 Fabric properties limitation
But, one of the major elements that is still a limitation of the 3D software is fabric proposition. As highlighted by Sandra Kuijpers, lecturer 3D at AMFI (see appendix 3) (Kuijpers, 2019), there is not yet a standardized fabric proposition tool used by all software developers. Every program uses its own tools and equipment to calculate fabric properties. This has its effect in differences in fitting and draping when comparing multiple software tools to real-life sampling.

On the other hand, the possibilities within the software are endless. 3DVP software companies update their systems regularly, while improving together with their customers to create the ultimate tools and support. When making the transition, software can be tailor-made to the exact needs, both by updates and own software add-ons (Reukers, 2019).

3.3 The social implementation
The fashion industry is perceived as a rapidly evolving industry, mainly because of trend sensitivity and the seasonally renewal (Bhardwaj & Fairhurst, 2010). But, from within the industry and its structure has not changed much. Since Industry 3.0, 2D CAD systems were introduced in the 1980’s and are still the standard for the industry (Young Hwang & HY Hahn, 2017). When working for so long with a system, people tend to be reluctant to change. Why would they change if it works? (Papahristou & Bilalis, Integrated Digital Prototyping in the Fashion Product Development, 2017). The reluctances of people to change their workflow is one of the biggest limitations when making the transition to 3DVP, as said by all interviewees (see appendix 1-2-3-4-5-6). For designers to convince their manager, or a manager to convince hers or his design team to work with 3DVP is time consuming. Stitch intentionally was set up with a start-up structure says Marlies (Reukers, 2019). The intention is to drive innovation and to be perceived as a cool and fun organisation to work with. This has had positive effect on co-workers at PVH who compete with departments against each other to be able to work with Stitch.

3.3.1 Time and experimentation
Since software is getting more advanced every day, it is key to convince those people by showing them the possibilities 3DVP offers (van Lier, 2019). This means, showing the program and its output and offering time to adapt to this new way of working (Kuijpers, 2019) (Young, 2019). Time is stated to be a key element (Kuijpers, 2019) (Young, 2019). AMFI’s summer school (AUAS, 2019) program called Virtual Fashion design: The New Real, offers the basic skills in 3DVP software in an intensive 2 week course in which 140 hours are spend learning the basic skills of 3DVP software. Taken into account that the student must have 2D pattern knowledge. This a
full-time 2-week course, not all companies have the time and resources to fund such a training for their personnel. These courses can be seen as a base and needs to be seen as a long-term investment. Trained personnel can instruct their team on how to develop their business process further.

The need for experimentation is key – ideally with a team, with a minimum of two persons (Kuijpers, 2019), who are fully dedicated to learning the program and implementing this into the new digital workflow. This implementation can only be achieved when the decision to make the transition to a full digital workflow comes from top-down (van Lier, 2019) (Reukers, 2019) (Young, 2019). Having employees fully focused on the new digital workflow is expensive, especially when a company does not have the liquidity to hire a person just for that. The other option is to have employees partially working with the new software, while executing their current job role. This inevitably makes the process slower, where normally the learning curve would take six months, will this stretch to a year (Kuijpers, 2019).

3.4 The potentials and limitations

The software offered by the 3DVP industry looks similar to each other. The devil is in the detail, just as for the offered software packages. Tailor-made software packages make the transition more smoothly into the organisational workflow. The software itself is continuously in development, with a major focus on 3D to real-life appearance and the realness of fabric proposition. The last factor is still in development and is one of the major challenges the 3DVP industry faces to create a standardized version. There is not yet exact information about the costs of the implementation of 3DVP in a workflow available. The software can be tailor-made, and the training time needed for the personnel differs per person.

In Table 3.1 the potentials and limitations are summed up. These assumptions were retrieved from the interviews (appendix 1-2-3-4-5) and from several software suppliers’ website. Some of these are both a limitation and potential at the same time, since they are depended on the customers’ needs. In the end, as said by all interviewees, it comes down to having enough budget and willingness from top management level to start developing a digital workflow and start experimenting with different software options.
Table 3.1: 3D transition factors as mentioned by the interviewees - potential and limitation overview

<table>
<thead>
<tr>
<th>POTENTIAL</th>
</tr>
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<tbody>
<tr>
<td>multiple 3D software providers</td>
</tr>
<tr>
<td>2D patterning &amp; 3D virtual prototyping in one package</td>
</tr>
<tr>
<td>software customization (Browzwear)</td>
</tr>
<tr>
<td>dedicated team of employees</td>
</tr>
<tr>
<td>experimentation to understand the software</td>
</tr>
<tr>
<td>connecting visualization rendering software (Marvelous Designer etc.)</td>
</tr>
<tr>
<td>3D VP as a cool innovative tool</td>
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</table>

<table>
<thead>
<tr>
<th>LIMITATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>multiple 3D software providers</td>
</tr>
<tr>
<td>no standardization in software</td>
</tr>
<tr>
<td>no standardization in fabric propositions</td>
</tr>
<tr>
<td>potential long learning curve</td>
</tr>
<tr>
<td>reluctant professionals</td>
</tr>
<tr>
<td>adapting to new software is time consuming</td>
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CHAPTER 4
The tools and skills sets needed when making the transition

4.1 The requirements needed for transition
When making the transition to a new digital workflow with 3DVP software there are potentials and limitations that arise. There are several software suppliers who supply 3DVP software which can be tailor-made to the companies’ needs but it is needed to invest time in researching which software fits best for the business process (Young, 2019). Experimenting and having a dedicated 3D team significantly helps to implement 3DVP with a smooth transition. To know what kind of software tools and hardware would fit the best for the current business process is the information researched and retrieved from the websites of the software suppliers. The research was done with the intention of not having to contact the suppliers, only retrieving the information from the company’s webpage. On the other hand, a new set of skills is required when making the transition to the new digital 3DVP workflow. Both soft skills and hard skills are discussed to emphasize what kind of skills a fashion professional need to have or obtain to create a smooth transition.

4.1.1 Searching for information
There are several software suppliers who offer 3DVP software. When speaking with Merja Lamberg, Designer at Oy-Basic fashion (Lamberg, 2019) (see appendix 6), expressed that she found it hard to find in-depth information from software suppliers without having to contact the supplier itself. She is interested and searched on websites from 3D software suppliers but gained not enough information to be fully informed on how to start with 3D. Lamberg also stated that several other colleagues expressed the same feelings when searching for information.

4.2 The software tools
The data was gathered and retrieved from the software suppliers listed in Table 4.1 together with the information stated on the website of software comparator (Capterra, 2019). This is to find out how transparent companies are to inform people who would like to work with their software without having to contact them individually. The research and retrieved the information from the websites were done manually with the intention to research if finding in-depth information can be done without being guided to a contact platform or the need to contact the supplier. This way of obtaining data is very subjective to the researcher. The data gathered is listed in Table 4.1. The focus is on the stated price of the software, if the software itself can combine 2D & 3D in one screen, if the software runs on Apple and Windows software, if external software can be integrated into the 3DVP software, if there is a digital community that helps the suppliers’ customers and if it was easy to find, for the researcher, information on their website. The last element is very subjective and influences the retrieved data from Table 4.1.
4.3 The required hardware

Besides the software, qualitative hardware is needed to keep up with the hefty hardware requirements for 3DVP software and rendering programs such as Marvelous Designer. Table 4.2 shows an overview of hardware requirements as stated by CLO 3D (CLO, 2019). The listed requirements are an ideal set up as stated by CLO 3D. It is, however, possible to run the software on lesser hardware but the smoothness of operations will be limited, and time needed for rendering will increase.

Other software suppliers do state an overview of the hardware requirements but these are found to be similar with the requirements stated by CLO 3D. Choosing either Windows or Apple is subjective to the user.
4.4 The needed soft skills and hard skills

To know what soft and hard skills are needed when working with 3DVP and making the transition a questionnaire was conducted with the 25 3D designers from PixelPool. Furthermore, the interviewees stated in their interviews (appendix 1-2-3-4-5) the skills they think an upcoming 3D fashion professional should have and gain. The mentioned skills were extracted from the interviews and combined. In Table 4.3 the soft and hard skills are stated as mentioned by the 25 in-house PixelPool 3D Designers. In Table 4.4 the soft and hard skills mentioned were retrieved from the conducted interviews (appendix 1-2-3-4-5) and combined.

Table 4.3: Soft and hard skills mentioned by PixelPool 3D Designers

<table>
<thead>
<tr>
<th>Skills</th>
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<tbody>
<tr>
<td>Consistency</td>
</tr>
<tr>
<td>Fashion interest &amp; intuition</td>
</tr>
<tr>
<td>3-dimensional thinking</td>
</tr>
<tr>
<td>Creativity</td>
</tr>
<tr>
<td>Commitment</td>
</tr>
<tr>
<td>Innovation</td>
</tr>
<tr>
<td>Willing to learn constantly</td>
</tr>
<tr>
<td>Pro-active</td>
</tr>
<tr>
<td>Adaptive</td>
</tr>
<tr>
<td>Communication</td>
</tr>
<tr>
<td>Team work</td>
</tr>
<tr>
<td>Curiosity</td>
</tr>
</tbody>
</table>

Source: (3D Design team & Van Lier, 2019)

Table 4.4: Mentioned soft and hard skills extracted from interviews and combined

<table>
<thead>
<tr>
<th>Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest in technology</td>
</tr>
<tr>
<td>3D Open-minded</td>
</tr>
<tr>
<td>Consistency</td>
</tr>
<tr>
<td>Pattern knowledge</td>
</tr>
<tr>
<td>2D patterning software knowlede</td>
</tr>
<tr>
<td>Willingness to learn</td>
</tr>
<tr>
<td>Curiosity</td>
</tr>
<tr>
<td>Dedication</td>
</tr>
<tr>
<td>Mindset to set 2D into 3D</td>
</tr>
</tbody>
</table>

Source: (Kuijpers, 2019), (Manuel, 2019), (Reukers, 2019), (van Lier, 2019), (Siersema, 2019)
4.5 The elements to focus on with the required skills and tools

The tools needed when making the transition are the software and the (computer) hardware to be able to operate fully digital. The software can be chosen from several suppliers, but the suppliers offer tailor-made solutions which inherently create tailor-made pricing. The hardware is up to personal taste as long as the hardware meets the requirements, or higher, for a future proof investment when the software gets upgraded.

However, a subjective conclusion is that software companies are not very transparent about what they exactly offer, what the total costs are and what is needed to be able to work with their tools. They do offer the information once you contact them and do showcase their finished software possibilities online. For someone who would like to start with 3D, basic information is hard to find and only CLO 3D offers some more extended information. In addition to that, it is not easy to know where to start researching when you do not have any basic knowledge.

The skill sets mentioned by the 3D designers from PixelPool are very similar to the ones stated by the interviewees. Pattern knowledge is a hard skill, where the others involve more soft skills. The conclusion can be made that fashion professionals need solid patterning knowledge and having an open-mindset towards 3D Design. It is all about dedication and team work to make the transition.
Conclusion

The time to start researching, experimenting, train and develop is now. Industry 4.0 has a major and undeniable impact on the fashion industry. The changes that come forth Industry 4.0 will influence on both social level and industry level. Now, specifically 3D virtual prototyping is the most sought-after digital development to further strengthen the design and development process. Bigger conglomerates have shown that implementing 3DVP software into their workflow offered them to be leaner and more agile, both with time and used resources.

With the transition to a new digital workflow challenges will arise. Designers and developers first have to learn to work with 3D software and translate their ideas into a 3D model. Therefor time and change-management are key components when a professional, team or company wants to create a smooth transition. The focus should lay first on the business process, to understand what the company or team needs. In addition, focus on which software applies to your specific needs. When setting the transition in motion it is key to inform everyone constantly what exactly is going to be changed with the help of models such as the ADKAR change management model. A vital element to communicate is that you gain new skills with 3D and will be more time efficient. Real change comes from a top-down perspective, management should be fully on-board to create a real transition within the company. Exploring the possibilities of end-to-end

It is all about the details when researching different 3DVP software suppliers. Tailor-made software packages offered by the suppliers will help to create the most suitable workflow. Tailor-made products create tailor-made pricing. Now, standardization is still not up to standard, every supplier has its own approach, but platforms concerning the 3DVP development in fashion are greatly involved creating industry wide standard. Experimenting and the ability to connect 3DVP end-to-end with other departments, such as marketing, enables to be future proof with the base product starting with designers and developers. Creating a cool vibe around working with 3D helps to encourage the transition and will help to motivate people.

It requires some serious hardware to work smoothly with 3DVP software. These elements are key components to invest in, besides the training of employees. The information that can be found about the different software suppliers is rather limited and suppliers need to be contacted separately to identify how they can be tailored to the company needs. However, they all do offer the same form of 3DVP with a lot of similarities. To use the software designers and developers need to have basic pattern knowledge and moreover being curious and eager to learn working with 3D.

Technology always starts with people. It takes some perseverance and time to show the benefits. Once people have learned about 3DVP and what it can do, they react very positive and see the possibilities in the synergy 3D can create with real-life garments. Some might be frightened by the thought of change but informing is the key element. The basics of 3DVP must be known by the majority of the industry to create a full industry wide transition. Transparency about the implementation of 3DVP should be a standard and companies should co-create on all levels to create a real new industry standardized digital workflow.
Limitation

For a major part the data was gathered by interviewing several professionals from the industry who are currently working with some form of 3D virtual prototyping. Their view on certain topics might be subjective to their work environment and expertise. Several more professional with different job roles have been asked to give their opinion and to be interviewed but have not responded. The interviews taken in person were recorded. Follow up questions were asked, which have let to interviews where not only the prepared questions have been asked.

There are more software suppliers available then those that have been researched. The researched suppliers were the ones most mentioned by AMFI staff and fashion professionals, being the larger and more known suppliers.

Hard facts about the costs of implementing 3DVP is very hard to find due to suppliers not publicly showcasing this. A possible explanation is that software suppliers only offer tailor-made software packages. Costs suggestions based on research are stated, however it is vital to do own research regarding the costs, which vary per situation. The software suppliers have not been contacted by the researcher for this information.

Intentionally, sustainability has not been named as a topic. Companies tend to still focus mainly on creating a leaner and more agile workflow and thus reducing costs. The fact that 3DVP eliminates unnecessary samples and the reduces the usage of transportation is nevertheless very true and an important aspect.

Future work

3DVP will be the new standard in the fashion industry. With Artificial Intelligence enabling both designers and software developers to co-create garments directly with the consumers or even art installations. This new synergy of digital with real-life gives fashion companies the ability to explore new paths which they were never able to explore before. 3DVP will adjust our working methods, but tools such as AI and Blockchain are the real game changers. How can AI be used with 3DVP software to let designers, consumers and artists co-create the ideal digital, or real-life, garment?
Appendix

Note:
Some of the interviews were vocally recorded and a transcript was created. The transcripts are stated in the appendix fully. Please note that not all words and sentences are correctly written out by the transcript software. All transcripts were supplied by online transcript app Trint (Trint, 2018).

Appendix 1
Marlies Reukers, 3D Design training & transformation specialist at PVH corp.
Interview conducted on 27 March 2019
Transcript retrieved on 8 April 2019

[00:00:02] First of all thanks to much for being here. Maybe if you could stay the bits we are and what you're actually doing at PVH. It’s this you want me to talk about.

[00:00:15] So I graduated but I’m happy last year in my see and I graduate it’s completely working already. I did some minor hybrid hypertrophy first where I started experiments again 3D and then I realized this is what I wanted to do. So my graduation was also really focused on how to implement 3D in the design process. I really focused on the like designing parts design developments and how you can implement what works and what doesn’t work how accurate. A fitting process is. And since August 2008 seniors started working for PVH and I worked for a tech startup called Stitch and so this is a startup that's funded by PvH and we are focused on implementing 3D from the start to the ends of the process. So our end goal is to have an end to end 3D digital process from design to development. Production manufacturing to digital sales. And we have like a whole interdisciplinary team basically that works on this. So we have developers and designers and business people all working together in the same team. And we develop tools to make 3D even easier sort of means like automation and plugins. And as with the developers builds and then we have the more business side of the team. And we are like really focused on the transformation. So a part of that team is the Academy which is what I run with one other colleague and then deal other hope the transformation team are 3D leads and they work.

[00:01:51] Into divisions so they work in prints. So moving your menswear we have two three leads and then day work basically in the design departments and I helped him day to day in a 3D process. They support them and how do we digitize this whole division and they are the direct link between us and departments basically.

[00:02:10] So we have a few departments we have 3D leads now and for the rest it’s mostly us the academy reaching out to all the different divisions. We are trying to digitize the whole process. Yeah. I hope that it’s and it’s both clear and good. Oh yeah. It’s for tommy hilfiger and calvin klein. So we really. Our users are like from the academy our users are really the designers weather makers and food technicians because we really want to do the whole designing stage but that goes hand-in-hand with bathroom developments and then we also have tools that screen developers like the tools that are built. One of them is also like a digital phone book. So they are building a tool in which they can present all the 3D essence digitally instead of printing. The renders on paper or running it on a physical phone worth because what’s the point. So and that’s again we’re linking it with merchandise and so in the end we really want to cover everything and everyone who has something to do with. Products will have work with the 3D products in the hands of the samples. And it's not necessarily also about like getting removing all the samples but it's more like making the samples more accurate. So. Like sometimes people are scared that they’re like oh they’re going to take my samples away but that’s not our aim like we want to make the samples more. Accurate than from higher standards. So you don’t have to request the sample to see the placement of the buckets to see the scale of the prints that you’re using because you can do all of that in 3-D and then for really specific fits purposes you could still order samples but then. Yeah your samples can just be much much higher standards because you have usually two or three some time for two or three samples pre-season within this company at least in their season. Would you say that the workload the. Time to have rates each season. Yeah. And. Yeah if you have that little time but you can. They would normally request the sample for book replacements and they can do that in two hours in 3D. Then the actual samples they order will be of much higher quality. That.

[00:04:37] Already covers a lot of stuff. So but then. Yeah that’s it’s a long story but no you’re at least you know kind of how it works. It starts off yeah. According to this group.

[00:04:48] So then I have a bit of a summary is that this stage is actually kind of a separate star from to me over
and you go grind with work slowly I guess for Tommy Hilfiger and Calvin Klein incorporates the solution that you find out there so you experiment I guess a lot find new stuff create new stuff visually great. I want you luck and I should say you do not create so very so very self you really didn’t enhance it.

[00:05:18] Yeah it’s kind of both. So we have plugins on top of browser for instance that’s also the reason why we work with browser because they have an open API which makes it easier for our developers to build stuff on top of it and like automates older rendering. Oh that’s just easier possible with browser and cholo isn’t as open Lichter. Software isn’t as open for them to build on top of it. And also we have good contacts with browser and they allow us to do this. So that is one of its. And then also they really build their own tools so to digital phone board that’s really our own. It’s not necessarily a software it’s it’s a web tool actually.

[00:06:01] So its work runs online. We have done one and we have another one which is called a design hub. At the moment my name might change and that’s like an online visual library basically. So if all your assets are you have all the fabrics in there all to be basic blocks or stitches dreams everything visually so you don’t have to go into this folder structure in a folder folder and open each file to see what it is etc. but you can filter it like a business decision I’m working for I work for this division I want to see. The color cards of this year. Something like that. So those are the ones that they develop in-house. And the reason that we do it in house is just to have control and we can do it ourselves like within one second we can change stuff if.

[00:06:51] It’s not working.

[00:06:53] Yeah. Yeah the reason also which you said like about. So right now we work solely for me and going claim in the future we might also work for auto companies. And that’s the reason why we’re separate. And why we also have a different building is to kind of have the distance right now. These are our first user groups and as soon as we have a full process running and like some people ask like over what is going to happen to your job. If so many incumbent line are completely digital then we go to other companies and we can sell these platforms at tools the plugins we can sell it to other companies we can implement the same trainings and workshops etc. So yeah I mean actually do you guys know what you said about teaching other. People.

[00:07:41] How to stitch incorporate their findings into Domi and golf like this is is it just they just give a laptop for the software give the training and that’s it.

[00:07:55] No or no it’s really a lot of support. So if you’re talking about like 3D learning 3D and. We push this software to their laptops stick in the solids and then they come into a training so in the academy have a few standard trainings where we just teach debate six of their software is a brogue Rose whereas two different softwares one of them is more focused on the better making where you can do basically everything and one of them is kind of a simplified version where there’s more focus on design so you can’t amend the patterns anymore. And that’s kind of disabled so you can just really easily do designs. And. Coloring up. Layer round but then on the same level. Yeah and it’s like it’s easier for designers who don’t work with buttons so they start with a stitched up block and then they can add design lines that can really color blocking they. Can kind of. Create fake seems as if there is a seam without having to really split the button. So it’s a really easy ways those two different softwares and we train in both and we have like a few standard trainings so people come in they gets really the basics of this is how it works we stitch a feature together and afterwards we really tailor do trainings to do users needs. Or we sit with them. They know what the software can do. No we ask them like hey what where do you want to use it to it process your workflow is it for fitting purposes for. Color wayetc. And we really tried to focus the trainings on that because the software is so broad that you appear like you can give them some trainings that they know everything but that doesn’t really work in our opinion because then people just forget it. It’s like an overload of information. So we really. Focus on Hey what do people want to get out of it. And we tried to let them see. The benefits of 3D in their workflow and start there and then we build it bigger and so everything goes 3D basically.

[00:09:53] It’s pretty cool to hear because that means that you’re really tailoring on the person that you’re working at the moment or expect and then who does actually use the 3D so very not Stitch but Tommy Hilfiger and do designers you’ll see a draw so deliver its design mostly design better makers and fit submissions.

[00:10:15] So in them it’s usually designers work with the notes are the Lafayette’s version bigger and better magazine fits ignitions with freestyle. Sure that’s the answer make under 30 virgin. And sometimes designers
are really. Open to it and they’re like I want Harvey singer as well. And then they do both. But that’s kind of dependent on the user and how what they once said in a way you have stuck to it.

[00:10:39] It’s almost a cliché necessary and necessary for design and thriller. If you stitcher because like I already play around in a more safe environment. What do you mean designers are working in a more safe environment. Yes. Without the ability to change. Yes. Yeah. It’s actually not very neat is because designing this could just play around already enough. Yeah. I’m program. Yes. But you have created rights.

[00:11:03] That’s what stage has. No deaths from Rosewood to this from No. Yeah. And that’s also the defense kind of bird per person for a designer but also per division in front of group.


[00:11:27] Have product basically. Yeah. Yeah. So that’s what we have like we always just everyone starts at the same level with those basic trainings and then everyone goes their own way. And we tried to support them and that’s and that’s also where we have those three leads. So day are kind of the direct connection between us and a division. In a future scenario. Like right now we don’t have a 3D lead in every division. So it’s a lot of responsibility but in the end we see it as we do all the trainings we facilitated and then the 3D leads comes was like hey this designer really wants who does this designer from. T-shirts once to focus more pleaseetc. And they. Kind of connect us to the people in their division. It’s really fun to do here because.

[00:12:20] It’s probably an overload of trainings that you have to give. Yeah several occasions as well. Yeah.

[00:12:25] And that’s the sort of thing like multiple times. Yeah. Yeah. Because it’s not never like it gives them one training and they’re getting it. Exactly. It’s love supports coming back. We have users coming in to just work and in our office do their thing that.

[00:12:38] Those follow up information that you probably haven’t got to do our free time over and over again. And of course every time so far enhances yourselves you don’t have to give new trees. So. Is it fair to stated that that stage is an ongoing project but that’s. Also maybe like an academic as you say because you have to constantly evaluate things. Yes it’s people.

[00:13:07] But I think that’s mostly in the process of going digital. Like it’s not like we would be doing this for 20 years.

[00:13:15] What was your favorite. What with what would you see in let’s say five years that to me has as a base to work with.

[00:13:23] I think it’s it’s really really hard to say like hopefully ideally we would work completely from start to end digital. I assume in five years we will be there hopefully but I think like time wise it’s really hard to say like when that would be or where we are in five years. But it’s mostly like as soon as everyone has like a couple of years of experience and like works multiple seasons in 3D and like every single step of the process. Then we are we don’t need to deliver it and supporting Martin is done. Derek good to go and maybe we would still beta if brushwork comes with a new version that we update them but that’s. That’s more than it’s a really small part because it’s eventually you get so. Used to the software you know it’s in and out and then they don’t need us anymore but we are still there trained get them there and also to get like every step of the process digital. So what do you see then as. The digital but also the social boundaries that you’re out of phase right now.

[00:14:29] When you play which implementing not both. Actually both are probably probably I think because you’re working with software you always have some boundaries because your self still needs being be inventions. But then also on the social level what do you what do you see when you get to trainings or friends and then what you already said is that you have to have a tailor made approach is really one what do you see other complication for you maybe reluctance and then yes it does really.

[00:14:54] I think the biggest benefits are we have in this company used us from the top down CEO management everyone knows that we’re going digital. So does it’s really in our favor because whenever we do training people come in they know OK eventually I will have to start doing this because otherwise because this company is going digital so. I will either do it now or within two years I will have to start working in 3D so that’s a really big benefits of. Life. Yeah. People just kind of accept it
and go with it. Because I know like in other companies I won't give any names hunches but like I've also heard colleagues who've done similar jobs in other companies doing trainings. If there's no plan they would just kind of. Wells and you say. It's a build event basically like reading without any structure giving trainings and it was more of like this thing that a manager would tell their designers like Hey. You need to do some 3D but they weren't really. Did didn't really want to do it. So it was more of this tick that they had to do it. Oh yeah. I followed my training and then they would leave and never touch this over again.

[00:16:09] Yeah. So I'm not sure what you're saying is that. There would've been some social boundaries for people who were just reluctant to work with it but because of the fact that from top level it is you know in the core of the strategy to work fully three.

[00:16:22] Yeah that's that's the main reason people are willing to learn and to.

[00:16:28] Yeah. The people who aren't really a fan of working digital for them like it so you have people who love it. You have people who are like Oh yeah. And. So do people who do who don't really see the big benefits. Yes day will still go with it because top down tells them they have to. And at this moment it's still.

[00:16:50] Pretty open and it's not like hey you need to do it now. And at this moment it's also coming back and also that we're kind of outside of the company and we have kind of this start of a fight in our office as well. Everyone we invite the users to come in for training in our office. So coming here because everyone who comes in is like quote is feels so cool and new and everyone has this idea of stages like artist that's really cool team and people are proud to say that they're working with us and that's kind of what we want to create is nuts. People coming in. Being forced to do a training.

[00:17:28] And to also give like a really positive five. Yes about that bit of company who does 3D but also how cool to work with them so yeah it becomes inherently also 3D then becomes more cooler because. It's.

[00:17:42] Good like meeting where it's already seen as a pretty cool. Yeah yeah yeah. So exactly. Yeah like there are there were some meetings from Calvin Klein where people were just telling each other like Oh yeah I'm also working with see you happy to be like really proud and kind of. Competing against each other like there's quite some competition between different divisions and they're are like competing like have we were already working three oh but we're presenting in 3D and you know like that no even even without the top level having it's been done yeah. Is brilliant innovator into it. Yeah.

[00:18:21] They wanted to be kind of the fore front runners you know it's like oh we started doing this from beginning on. So that's not to say about 3D but more about the fact that it's a bit of more motivational way working and that is just yeah.

[00:18:36] And I think also a lot of people see the benefits in this. No Dad it's one of the better to industry. Like saving time saving samples. Also accuracy is like right now. It's just flat sketches you know in the tech banks it's so subjective no way. And like every and everyone's handwriting in sketches is different. If I draw just denim jackets and a flat sketch in his trade our eyes are for a different lead in Utah. Yeah. How does the factory know you know it's based on facts so it's much you know which if you request a sample and a sample is based on a 3D model it's you know what you're going to expect. Right now if you request a sample you just hope that it is what you. Would you envision. And I think that's the biggest thing that you just get more accuracy as well as. It's just where. Like why are we shipping all these samples. Relief takes away subjectivity actually for a bigger part. Yeah I think more. Because it's more just said it's easy to see what it is. Like there's you you take away basically the. Inconsistency in a way. Like. You. Thinking. Maybe. I can think of the reasoning that is neater in Dutch. The Dutch you need some approval overlaps.

[00:20:07] She's well since it's necessary for it I drew out all the yeah and it's all there. Yeah because it's based on fact not like everyone is shows the same language. And it's do you have one source. Once there's a source of truth basically yeah it's one file does everyone can work in.

[00:20:25] Yeah because if I draw a drawing it's different than yours. Yeah. While we still have to see how efficient the same decade. Yeah but if we were both in that stupid program we aren't adjusted to have it definitely because then it would be a different yes.

[00:20:38] Yeah and also like even if you work with teams across like with teams in Hong Kong and we just work overnight in the same guard files day some our fault that they’ve been working on I updated through today.
here. As to them tomorrow morning when it's daytime in Hong Kong to continue and that's so easy that you can just it's it takes a lot of leg working organize because you can also end up with 20 different versions of the same file. But in the end if you managed to organize that process you just have one file that's once just the truth and everyone works with the same. Okay. And I've been it's also and one thing maybe you don’t want to go to that direction like 3D can also populates software like BLM. and you know BLM through big reforms and we are also working on integration that's you could have the 3D file you uploaded in that's design hubs like design platform Yeah and then from there it's automatically rendered directors are sent BLM and all day information of like Hey. You use this February to use this this will be like pulled out of 3 file and pulled into BLM. Because Indian that's what we notice here as well a lot of designers spend so much time just updating tech things like I feel like 60 percent of their workload is just tech because that's not designed to you know one day it just goes live to updates and even under review and then oh we need to update techniques and like just signed and sure it was so time consuming and indians.

[00:22:16] If you have the 3D file you work in 3D all the information is in there. So why would you still have to manually enter all the data into BLM if you can just extracted the fabric isn't there. The button is in there is the size of a button in there. Yeah. Yeah.

[00:22:31] Yeah. So I think I'm going a bit on your person Laughter Well that's actually the limitation that you're committed to working with so far. It's. Like I can go into all these tiny little detail but that's what are the main for you now the main limitation is that maybe at the the fabric is not accurate enough or that the fit is not accurate and I think for after fabrics big limitation is that there is no standard across different so worse. And that’s if it does actually comes to like any 3D assets like every rose where has their own fabric files their own.

[00:23:09] BLOCK files like if you would have a garment in 3D in rows where you would want to import it in flow you have to stitch it up again like you can export to patterns but you start from Flip bearings again so it is actually average between all these software programs. Yes. Yeah it's kind of dotted CPG but on a more easy bond that you can use in certain. Yeah it's in a way kind of like. In graphic design just everyone works with Adobe you know and here it's still all these different companies doing their own thing. Yeah. And at the moment it's mostly film Glory. You’re like competing to be different. And. Like the browser and if. Do you know if he's you. Yeah. They came up with Lincoln fabric standards. The U3 M Foreman's in there if you read about it. But in the end it's still that's not supported by the other ones. So you kind of want to. I think that's a really big thing of like the olide's suits and the digitization of. The digital files that you need for. For 3D. Yeah. Of dreams everything it’s not. Completely interchangeable between different so for us and that's a big thing. You have some builds if you want to work with the multiple software as did you have to build it in.

[00:24:26] CLO and Ambrose where and.

[00:24:29] Yeah. So I think that's a big thing and with the potential that can I see. So many I think what you see then.

[00:24:40] For you what would be the most perfect way of having this treaty so far really integrated.

[00:24:47] Why didn't do you like him which were flu. Yeah and have workflow. Yeah. I think you would start with liked it better makers would already work in 3D.

[00:24:57] So like it's a start of a design process a designer would come off with like hey I wins doesn't it sir. Then they go to the better make a request like hey wins doesn't the style day build better and sometimes a better makers are also. We don't have them in-house and it better has come from the factories. That's another. Big point in a way because some factories don't share their feathers. That's her effective workflow. So Dawood requested and I think it would be perfect if the designer would just start designing cat's basic block that we already have or like from previous seasons they can take that from for instance that design up to have all the visual stuff you just gets a would do i want to do i take a block that looks like the style that I want to make he gets older fabrics and narrow and you create the first idea of what you would want to do present you handed over to the bad depending makers actually maybe the designer starts working in in the basic form to really work on for.

[00:26:00] For me yes once a color fabrics. Yeah. And then handed over the 3D file to the pattern maker.

[00:26:08] Yeah. Created to default or even at the same time if they already know like hey this is what I want to do. They would. Tell that to the feather maker Dagon developed the buttons and as soon as the feathers
already started working on that file yeah. But then that’s another thing that would be really cool. So forth would implement it you could kind of copy paste the designs you know that if you have. Designs garments like I have this denim jacket was all the detailing watches buttons etc. And I have another jacket with a different fits a basic block that you could just copy basically older. Design elements. Yeah and that’s something the browser is like aware also both it’s super hard and complicated of course but that would be like I don’t know a scenario does it would be the same file and otherwise you’d just do it all over again.

[00:27:01] Yeah so that’s still a bit of a limitation it’s that you can work the days leading designer and the better make you it and still sometimes have to switch yes or the real better and yeah in order to create civil 3D. Yeah. And then like Indians you really want to have just one file which includes everything. Which would populate PLM. Too. Especially.

[00:27:28] Those who say. Oh. Yeah. I think so. So eventually you’d want to have just that one file which is your final file and you would want to send that file to the factories. Instead of like a 2D took back stencils or would you see right now is still does sometimes to day work in 3D in the design stage. But still the manufacturing is done through normal 2D flat tech back out. And I think that’s the biggest thing that you want to have all separate steps in 3D and connect them. Because that’s what I also saw. Where did I finish my workflow.

[00:28:06] Because it’s it’s all go all over the place sorry. Yeah. So eventually you understand out outs and use that same file also for instance in these digital shorts. That’s the workflow at the end of the seal.

[00:28:19] And show room. That’s that’s from star to the design and it better make it to the seal show room. Yeah. Fully digital. Yeah. You one last question. Yeah. So the way you go is actually.

[00:28:34] Maybe just like I’ve been pointer but I’m sure what the tools and skills are do you think that you needed to learn what they do. So that you already own. This you also know things that you need to learn for the future for future designers. Yeah. Yeah. Well for you actually for me no say is it determined more in the role as a 3D so very different. I didn’t defend it very. But.

[00:28:59] Let me rephrase it maybe like what I need to learn or what those companies would need to learn works.

[00:29:05] So you know I’m was with this new working method and these new workflow. Yeah. What do you still have to learn with working based on workflow. Again me or you know what you to learn. I think for me the biggest thing is that I like what I’m trying to learn here is really about like the company structure and how everything works just a whole process from. Mostly like the manufacturing bit like this. Less my own area like how does.

[00:29:39] Relations release. Yeah yeah yeah with like Baker is how it works how everything just connects together. That’s what I’m personally trying to learn to get more even more of an overview for overview of the 3D Digitization process.

[00:29:58] Yeah. No one knows what skill sets. Does a non 3D user have to learn in order to work with your workflow.

[00:30:08] Mostly just the 3D software obviously how it works. And also I think with that comes a bit more of a Technical. Focus. So. Kind of. Embrace. Not necessarily embrace the technical aspects but you can’t really. Work on. Personally I believe like you can design a garment if you don’t know how to garments constructors and so you kind of need to know the basics of garment construction and veterans so that’s more of a technical thing and I think.

[00:30:41] That’s really that will make your design process better. If you work. Like doesn’t matter if you work in 3D or not. This is what always makes your design process better and in 3D it’s super beneficial. You. Can do so much more. So I think that comes with it like learning the software. Also learning about. How it works. The whole. 3D what’s going on and what you can do with 3D with animation. Rendering fits and so much work. Thanks for this.

[00:31:12] I could like talk her three hours by the guy got so many.
Appendix 2

Cas van Lier, Marketing & Communication specialist at PixelPool
Interview conducted on 1 April 2019
Transcript retrieved on 3 April 2019

[00:00:02] All right. So thank you for having me.

[00:00:04] So the thing is that I of course believe me the reasons on the website. So let's start with a bit of questioning about the Expo itself cause maybe how they attracted to the customers and to the market. So you're over actually several tools and neurologically digital tools and solutions mostly for also as you already said virtual assembly and also officials say for store concepts. But whether these execs especially station that's picks up will focus on whether the main focus points those three levels.

[00:00:40] Well we come from a visualization background. So we started out as an Architectural Visualization firm and then we got in touch with Nike and then we switched to apparel fashion. We still have an architectural office in Poland. So now there's basically three silos that we work on. So one is the interactive merchandising tool that we're going to launch which basically incorporates all the things we do together.

[00:01:07] So that's fish realization and asset creation socialization is mostly story interiors. So let's say Nike's got a luncheon area next day campaign. They come to us and ask to ask us to visualize the storefronts or to make our London store with specific elements that they want to have in the campaign. That's what we do. And then asset creation is basically visualizing 3D garments. So let's say Nike has a new collection. We visualize the whole collection in 3-D. That way they can communicate Foster internally so let's say a designer wants to get approval on a piece of clothing instead of getting it. You know Facebook created somewhere in Asia for example value all the way back if they could just show them that the 3D model and then easily adjust them. And that's I mean they work with three day 3D programs like glow or detect for example and then they combine it with us basically. So those are the two main things for that visualization and carbon creation. And then the two is we create an empty store space. With fixtures that they can hang stuff on full stuff on or hollow body stuff. And based on their collection and their personal specifications that they that they want for their store they can insert it into the tool. Say say it like you want have 50 percent pants or trousers 20 percent sweaters. So much of this call or so much of that color and then they press the button and then all the merchandise is it. That's what we're working right now. And those are the three main things we do now.

[00:02:56] And do another sign on therapies is then the patterns that France for Nike make. Also the 3D for prototyping are examples is it and also that they send you to veterans and then you're right. And Claude do you also have your design as create a practice itself.

[00:03:13] And we don't create patterns ourselves it's only for the visualization of the product. So it may be that the fit is not percent correct as then as Ben Knight once noted the fit is this correct. It's just that the way it depends how much money they want to spend on the sample the more to spend the more detail. If they spend a little bit less so they don't want the accepted pattern or exact color. It's just it could be gray it could be blue. But the the fit is correct. So we have 3D models like you once that effort. Yeah exactly. And then they're hollow body. Yeah. That's sort of the pattern that I've created with fish taxation are also being used by Nike to send to the.

[00:03:55] Production factories.

[00:03:57] I think they do that with clothing with. So we're not done from the files that that Expo has created now. OK. So day it's hard to explain. Day There designers create the clothing I assume in love Be sure to try and say that they start to write code. Yeah. OK. And then if they want their whole collection visualized and so the designers are capable of doing that we have a whole office in Bulgaria with like 30 people and they're able to create like thousands of garments for each season and then so depending on how detailed they want them to be we can incorporate the patterns as well. We don't create them.

[00:04:34] Yeah. OK. Thanks guys. OK. Yes. Quickly.

[00:04:40] And I expected you have several more clients and I'm an only Nike. Yeah. And then when they're actually done the clients initial reasons to start working with fixable and then. Isn't just because they see 3-D as a oh that's nice. So somewhere on the Internet are. They mainly come to picture pool to.
Really have their workflow changed. There are a couple of very big companies out there like Nike like Levi’s like PVH things like that. They really want to change their workflow and incorporate it for it to become a part of their organization to make the bigger brands. Yeah. They’re really big brands. And then the rest of the brands basically are basically flirting with the idea of using 3D somewhere in their workflow but they don’t know how or they don’t know what. So a lot of the questions we get are are just very general like how how could you help us. Yes it can and it’s a bit difficult to answer that question because there’s so many applications not just the article itself but the whole inefficiency. Yeah that’s so it’s it’s hard to answer to the question How can you help me because we have to know like where do you want to sell. Because you of course have the main focus point the jury told but they may be searching for other topics. It’s actually also guiding them down the first steps. Sometimes we’re good we guide them sometimes we ignore it. Basically yeah like sometimes like so many questions are ignored. Companies itself. Both I would say like if I if I go through the contacts forum and sometimes I get a question like How do I incorporate 3D into my fashion company. Yeah I’m not going to look ask if they become clients then that’s I mean if they’re if you’re big enough and serious enough then that’s not really a question. You’re you’re going to ask normally. That’s probably one person doing one collection of a couple of garments and then I go Yeah. So I’m not going to bother with that but you know the other day that the men that Peter Bjorn all month was named the guy that created peak I think. Yeah yeah. He came back in the context from asking us to do to help him with some ridiculous setting up I’m not sure what it was. And then it’s a it’s a much more clear story he wants us to create this and this is very. And if somebody asked me how can how can I use 3D in my company. And it’s basically just Googling. Yeah. You don’t ask on any front end up to be executive. And then also would you say that the people that contact you with that general question. Is it more like a designer who really wants to work in 3D and doesn’t have a manager or a corporation where you work at that.

Yes I think so I answered Yeah and then they they must some day confuse us with let’s say clo. Yeah.

So they think that we provide them the tools to actually design the clothing money. As of now we are surface more than a tool. So CLO and companies have got there are not our competitors because we’re not after the same thing because you work for clo I guess that’s okay. Yeah we help them actually browse whereas Well we both Globe they give us too. We work with it and then we provide them feedback on how we like to see work better. Yeah.

But but still it’s not our main software we use it’s more think my marvellous designer. So at the actual 3D design software and not pattern making I see the officially sanctioned Yeah that’s the main focus. So not designing we don’t have designers working here but the artists in the video. Yeah. It’s more technical. Half. Real quick.

Great. Now I need doesn’t read about them. Of course you started as a architectural company which pretty cool I guess because I’m also with them and I can hear them on the beginning. My reason is that of course they’re architects. The world is already a bit more focused on 3D software and officially I say it’s actually a great example for the office. Yeah exactly and that’s and that’s also what I want to have in my rich now is that why doesn’t work over there at the end of the year.

And then I made some guesses for me on that because of course if you work with concrete it’s a bit easier to have a realistic visualization of the productivity as the outcome.

But why did pixel actually transform itself to make more fashion a.

Yeah I don’t know. I think we got in touch through somebody that knew somebody like. Well I wasn’t ready it was like 20 years ago thing but this happened. So somebody within the office got in touch with somebody with Nike and they both saw like an interesting synergy or joint venture possibility.

And from there on they just saw the possibilities and the the market that was available because it wasn’t happening in fashion at all.

And I guess that actually the driver. Yeah. Yeah definitely. Yeah. Without negatively I don’t know if he would be in fashion at all and the architecture was already the official ization of architecture. So now not going to be designing buildings OK but just the visualization. So I’m sorry. So you you’re where you actually worked within this kind of process but then returns form to another kind of working method. There’s just one connection
and the company switched its focus. I mean we still do. Architecture is going really well. Yeah but this is such a big big markets because architecture if you look up. I also got you know and then with the big she’s a favor and overnight it sinks to the beautiful items. It’s really sick and I don’t know why it works over there and not infection will be obvious. Maybe yeah the mindset or the arrogance maybe yeah maybe I think also it’s it’s a bit.

I to figure it out but I’m also a bit focused on why there has to change so easily and artistic. For now I had maybe do two reasons that maybe arrogance bits in the fashion industry because we see a lot of factors how we work is just fine. So why Jeb might change it. Yeah. And also is that the programs itself. People are still waiting on. Somebody to hold a guy up before professional read like tangible person so they really are trying to get the pension balls as possible.

Not a bit of words that I see that go out. That’s funny.

Yeah. Yeah. And then maybe I go. Maybe that what you didn’t know because you’re having work with architecture people but I had a kind of a sub question on why you’re more willing to work with 3D software but I guess it’s also a bit of a guessing for you.

I don’t know. Yeah. I know. I think maybe because people who are architects or visual visualize in architecture are mostly engineers who he something technical as a study so it’s more likely for them to be interested in and get interested in the more technical software stuff. Maybe but that would be something. Yeah that’s me. Yeah. Because it’s more likely for an architect or an engineer to maybe did that transition is maybe a bit easier. Yeah. Thinking really because a career in fashion like a classical fashion school. You work with a pencil or pen. You know not so much maybe now it’s different of course with I’m for you but.

Maybe that’s could be an indicator of reason. Yeah. Yeah. I think also that the transition should be a bit more smooth down a bit more openness me this I think.

Yeah but that’s not the topic I guess about stability sometimes. So yeah. And then also maybe that I’ve kind of sub also for that is it.

How do you think we speak to clients. How open are the people they’ve come to from fashion companies come to big school.

I probably already a bit more open to work with a program and designing. Yeah.

But how do you think that. For instance you have to know that one person who just emailed you randomly asking about how to implement a little stuff for his five small pieces.

How do you think that then that the company around the works. Do you think that they are just so reluctant and also thinking hey I’m just not seeing it at the moment. What do you think that why are people so reluctant in the fashion industry if they’re not willing to work with 3-D already. I think the people that approach us normally are really excited.

For example we’ve been talking to Gee star for a while. We met one that the head of the RTA they’re in an event very she’s very interested and laugh a lot.

But for her the thing is that the higher ups won’t give her a budget or don’t feel the need to do it. So then the person that approaches us is mostly the most enthusiastic and that’s going to be our brand ambassador. That’s going to persuade her like to use 3-D or use us in their workflow. So it was I did that mostly it starts actually with the creatives. I’m not quite sure to be honest it starts with it’s different a lot. It could be a salesperson.

It could be a great person. But normally somebody a little high up in the. Hierarchy of a company that’s normally the case.

Normally I would say so. So you would also say that it needs a top down decision making in order to have a real. I think so it’s bottom up then. And normally it doesn’t really work out.

Great And then also.

The thing is that what we just see that the reasons are for if Francis and the one from Jesus contradict you and they’re pretty open. That’s quite highly ranked person maybe I think if you had about the eight. But still she has some top level people who are just still reluctant or not.
What do you think their reasons are to be reluctant to think it’s just purely money. So like you said before if it if it ain’t broke don’t fix it. So why spend money on something that could help us. But it’s going well now.

Yeah I know. So you’re not willing to spend it because they don’t actually need it needed. Yeah. So I think it’s very important for companies like us to communicate out worth what our advantages are. So if you use our services or our tools. What. What do you gain. But that’s very hard to measure. I’ve tried it already. Asking fashion brands or people within fashion brands. How exactly does it cost to create one physical t shirt or one physical. Jean say. Which is a lot. And with our help it costs a fraction of that. But we can actually express it in hard numbers because nobody wants to share with you I ask this.

Yeah.

So we actually say it always comes down on money. I think I miss it. Yeah it’s just money. And nowadays it’s it’s starting to become a giving to you know sustainability is a very hot topic or a guy or a R and it’s it’s really cute to use a word like sustainability. Just for sake of marketing. But you know there’s only a few companies. Take Stella McCartney for example. Big Levi’s there. There actually were H them without ads. Well they’re actually trying to make a difference instead of just saying they will stay together by 2010. Not doing it there. So it’s it’s difficult to see who’s really in it and who’s just talking shit. Basically yeah. I’ve had this kind of thing if it. So it’s it’s again made that bigger companies. And do you then think also because of the bigger companies because they just have the money to invest in India. I think so too and they have maybe a bigger drive to stay the biggest company or in their part of the market. Yeah. And don’t really know why they want to probably show off to the world that they’re leading the industry. Yeah really. Yeah. Yeah. So I think that’s they want to be seen as a leader because they’re one of the biggest and they can afford it as well. Yeah I know. Yeah some combination of money and willingness to do it. That’s the golden combination.

Yeah. And do you think that they also are pretty open to the new workflow. Because it would change a lot if they would be incorporated fully into them. Do you also offer as fixable to really. Like set up a workflow within the company and then eventually.

Fixable finding out. Well it’s. We could do that for our tool in the future but for now we cannot back out because we’re not. A tool yet. We’re a service so we have to get for them. And I. Don’t know what the normal procedure is when a new company joins us. Normally we have to show them a proof of concepts so we give a presentation of what we can offer them what it looks like and how it can be implemented into their workflow. And then I think normally there’s a person that’s our contacts within that company. Be a project manager or something in a good direction and then they work together with a project manager within pixel and they have contact in a sense the samples with feedback and blah blah blah.

So we’re not really in the consultancy area of taking people by the hand and showing them how to completely transform their workflow but because we just don’t have the people for it or the bits of what we do. Yeah there are companies that do that though I believe or at least just a consultant that goes to company to explain to them what the options are and how to get a rapport with them.

And once down the designs of the manager and worked towards with big sample how do you think they’re coping with the new. We didn’t even transition. Do they see it as a full transition for themselves or is it real like a multi-year plan really can really is also socially and she kind of way. You see the benefits of this product. I can’t answer the question I did. I don’t know. Yeah I’m too far away from that part of the company to having to be I also want to mention that as you can probably if you send the bill to use you somebody who could answer.

That.

I also talked with a girl who I know from unfree and she’s now working at you probably know the company from from PVH. And what it did there. Well what you told me what they did is that they eat she set up stage as a startup kind of company to really have a cool fight going on around the company and also to. Let 3D be a cool subject for its very smart leader. Calvin Klein was pretty smart. That’s good to have because with what they now sense of what she sense from the people working Tommy Hilfiger or cough Glenn or reluctance of first foremost it comes from the top down like real top down.

So people have to work so if they are re-elected they still have to work with it. That of course helps some months. But what she also cites is that there’s also some
competitiveness between departments when they're working in 3D that they're more cool than the other department it doesn't work on your world stage which is pretty cool because then you really get an intrinsic different vibe going on. I'm working with 3-D actually or having the implementation also having to.

[00:21:06] Wanting to implement it the same within within like you actually between different geos so between like the European Office to the Asian office they don't want the other to know what they're working with when it comes to 3D so it's very weird actually.

[00:21:27] Yeah it's insane. So if that's that's what that's exactly what's fashion. Yeah but that's about it. That's exactly why we're here. Figure out the eyes of the eye.

[00:21:37] That's what is actually very smart for states to set it up as a it's a cool fun young startup company because as as a 3D company within fashion you're the people that work for you are 3D artists and developers.

[00:21:54] So you have to compete with the gaming industry. Yeah because that's where I normally go to the game history is way more interesting than visualizing clothing. You know for them path so it's very hard for us to even though we're we're growing and we need new people. It takes a lot of time for us to get a new developer or a new artist because you know why work for us if you can work for a Triple A game.


[00:22:21] I think it's been hard because I know he's also looking for out of the same people as you were before and actually trying to poach our employees and Bulgaria and saying you can come work for for a normal salary and the let in Amsterdam and all that.

[00:22:37] It's very competitive.

[00:22:40] Yeah I think that's also maybe we'll be a conclusion. But the fact is that there's just too much competitiveness. And. Well we see.


[00:22:57] Actually do when making this decision to the digital workflow for companies. Well it's actually down the limitation that you experience speaks.

[00:23:05] Yeah it's fixable. When creating the digital workflow is it maybe a communication which way to design someone something totally different. Or is it's just software limitations or I think it's two things communication and money and maybe time those three things very general but yeah. So the other day I said in the same room as a two project managers. And Yost and the creative lead. So I hear all the stuff that's going on with it within the projects. And there's was. There's one lady working. She doesn't work for Nike anymore but she was working for Nike and she had to provide the project manager and our artist with the right instructions for the right briefing basically for us to create what she wanted. And every time it wasn't good enough. So we had to go back to her and it would take more time and she didn't want to pay for the extra hours. Yeah. So I think that's the. I guess it depends on the person normally. That's not really a big issue but sometimes there's someone who just doesn't understand how it works I guess so they don't understand that your preaching has to be exactly right for you not to spend extra money on ours. Yeah it's hard work because you're breathing with shit they can help you. You also have to learn how you have a certification. It's also a new communication up different tool actually because that's also what they experience at stages is that.

[00:24:30] They are actually also kind of like teachers. Now she finds herself though she gives a lot of lectures and also just how it works what it does. Teachers have to basically not know what it is let's forget it is half. An.


[00:24:47] And what do you see as potential of course of course you have already the digital workflow and working with it. And is it important or any other potential. No but what do you see in the coming years maybe coming up will be the ideal setting for example if they could work with a company.

[00:25:02] Well I think right now the ideals outcome would be that we there are a lot of big companies that are very interested in the tooled up we're not going to lunch and it's very frustrating for us to tell them right now that we don't have anything to sell them that will change. And this year maybe beginning next year. And what I. Kind of expect to happen or in an ideal situation would like to happen is that everybody all the visual
merchandisers and all the sales people will start using our tool as like the adobe of a fashion basically. So let's say that Levi's purchases a thousand licenses and they kind of become are our inefficient partner for example and they they show the world what. Are the possibilities and capabilities are far too then I don't think there are any limitations. I think if everybody sees what is possible with 3D then it's not only good for our company but also for the fashion industry of course and other companies providing enough innovative solutions. So that's right now is what I would like to see.

[00:26:13] Great. And then just a last question last one. So.

[00:26:20] What kind of people do we actually need to really start working as maybe fixable to I have to have like a 3D designer. You have to have a.

[00:26:30] W was something other but didn't make then the implementation is only or is it more that you create your fully solely own silver.

[00:26:41] Well the back end or the back office. We have a company doing that with us for us. So we don't really have that expertise but everything that's not on real everything that's done with visualization. That's all artists and developers Yeah. So those are the people that create everything around that. Just have a project manager. Yes I have a production supervisor managing director.

[00:27:10] Yeah. D O series is basically the same as every other company. No does that answer your question. Yeah yeah yeah. Yeah. I think I have it all perfect. Thanks for that. Yeah. I can.
All right. Thank you. So you have met several people from the industry of course when you have done some traveling and go into some experience and meetings for this assessment by a barrel. And then the first question actually is what's the general reaction we tell them that you teach three days or two prototyping.

How did they react when it took two fashion companies or an Yeah. It's a lot of people said it's very good to teach and educate students which we do virtual prototyping and.

A lot also want to interact with us at that they want to set up something they invite us. That's why we. I was. I'm often enforced in API apparel so it's a little bit different because I'm yeah setting a direction with a fabric measurement there.

Yeah. And.

Yeah. So I love this. In that stream so they don't see me often as a teacher there. But I was. I'm also have been in panels as a teacher and then after the panel they come to me and they want to exchange cards and set up something that's why you went to Burberry. End of the semester. It's always a long brat before you have set up something little company and it's actually also not my job.

Um but are there more than because I want to set up so they see the possibilities out. But is it more that they are just there maybe are looking into it because they don't have the knowledge and want to have the knowledge from Alfie or is it more that they already have game knowledge.

I think that I'm free will help and further boats.

Both Yeah. There was a company in Turkey and they were working really well but they had a 20 foot tall showroom.

They had all these high end department bits ready for travel and they want to do something with us and it's a little bit Turkish.

Zara brand and and other companies stay.

They want to have our experience. They are interested in setting it up and they want to have our students doing an internship with them and also other companies they look forward DSL and later on. They are people go there. Yeah it really differs that company. There are programs.

Out of strategy in terms of course and then do them more often meet the designers who want to work or the product developers who want to work with 3D or mainly the strategy makers in the business.

We're really seeing the future for this boat both and about strategy makers but sometimes companies also put designers if they are in a company that put them on certain positions to make the change.

OK. That's uh that's the thing. Yeah.

But they're still probably working for their old job.

And some 3D stuff to maybe experience it really depends on the company.

There are some companies that really set it up very well. They think it through and they invest a lot in it and they have.

I think when you do a change like this you need extra people. I was in the 80s 90s and beginning of the century. I did a lot of transformations from companies from manual to digital better timing and then in all the cases we needed extra hands. And when it's running at you can go continue with less hands than you had before. OK. Habit that is a sort of investment is there's not only an investment in the software but you also need extra people to do to make it happen.

Because when you start there is more work so then you could maybe say that's actually a one time investments. Yeah. Yes a five year investment.

That's what I saw with the to the from manual to 2D.

When I look at my own experience.
I worked in a company and then there was a time that there was still factories in the Netherlands. So there was one factory and they digitized everything for us. So we had already our blocks which we used to work with and the base collection never you look at the pyramids out of phone company. We had a base already and we could work on those styles.

So there was already digital. And that helped a lot. And so there were no extra people but artists shifted into that. But it wouldn't have worked if we didn't have all those patterns digitized. And I worked as articles and then they hired me extra and we made the change from manual to digital I'd easily be different. But I think that's really this model all. And it's also about a change.

And with had I think for people worked on regular base of five days a week it was it depends a little bit on the people. But for most of them it was done in. Six months. And for people who work part time it was difficult still after a year to adapt to adapt. But that's something you hear also because to be hats in the industry if you change to another program with 2D patterning. Could also then you work part time. It could also take a year before you want when you old speaks again. I just patterning program what we do in school is just you use it a little bit but the people who are work with it on a daily basis they know all the shortcomings by arts and they just they go very quick and if they have to look how to do something then their hands are tied on their back.

That's also I think a reason why so fast sometimes is a little bit old school because there's so many people working meetings and they get a yeah they get a half a problem if they change it.

And I think with 3D it's the same with 3D it falls more and it depends also what you want to do with it.

So it needs to be the company and you really need to know what their end purposes when work.

Yeah. Values of a value want to set a value want to use it.

And if you.

What I know from my role in the treaty I see retail between the retail coalition and the RC innovation we are focusing on having one mass measurement system to measure the fabrics and having the same unity is used by also fair suppliers and that we push that to the mills. We are now going to talk with Mills and that you get at. A fabric store where the properties splits or perhaps if you have to switch book you know switch book how you have sketchbook and it is already had it is already it comes with the fabric and there is a connection. I know that the FEC is basically that they use also the properties from the measurements the browser market. So if you measure something that eyebrows were kids then.

Yeah. You can already take it. You can already use it in their database. So I think this will end. Yeah. Grow up massive. But first we need to fix the measurements because that's really a thing.

If you think that that also is a key point. The measurements of the fabric that gets people bits more holding back to working towards 3-D.

Because yeah. Because it's reliable. Yeah. If if a lot of companies they work with 3D different so fast. And if they have the same material they need to measure rates for each year. Software they need to measure three times and then then they have to say material it is a different reason results in each software. So our goal is to each set up to have a storm that's for that.

And we have the company's worldwide coalition of companies needs who work on board ready to work for 20 photo prototyping and we'll add the first thing that you started 3D virtual prototyping. Then you face that people need to do it. You.

It's one of the following steps that you faced the fabrics and how to deal with it was it not you. That's. Someone from PVH said to you during your hyper craft and presentation you had a collection of its fabrics fabrics that I ask you Did you measure those fabrics they remember. Yeah yeah. Because for them it was such a key thing. Yeah. You should measure it because you need to measure. So if you want to use those fabric you didn't have time to do that. But for them it was really weird that you are doing that. And they were.

Already basically dead at least umbilicus. He's also with me in the in the coalition and I know at Target they have someone who is measuring with a two text device. I'm not sure if I can. I'm I allowed to say they used to be texting and. Yeah. They have issues with bending and bending is most important measurement. How every
one measures have issues. And we are. About to publish a report on this. And then we need to do a little bit more research because we all almost have found which things we need to measure the properties and then we need to do some more testing with the supply us with the Close the process. And I think the electrons and the garbage they can easily implement it because they have been already very flexible with using things which were already there and then that will be step. But I think that’s a little bit aside from what you want to know.

[00:12:07] No I think it’s very valuable because it shows maybe those limitations of the programs and thus what maybe makes people a bit more holding back towards working with the system and maybe also the fact that it’s so scattered at the moment that you have such all overplays measurements or work methods or. Yeah I think that grabs a key element of what maybe gets people a bit more reluctant towards working or making the first step actually. Yeah. And it’s also what I experience with big boys are they often get just like an email. What should I do. To start with 3D and that’s I think the main reason with also those kind of stands are sets.

[00:12:49] And Matt I think it’s much easier for you. Yeah yeah yeah. They have to material which gifts the trust and that’s also a coalition working on advertising because that’s also an issue. And I think it’s good that the Alpha on avatars are now available now. Point. Which program you open you have to. Elfman avatars. So that also gives us sort of trust because everybody is also a big issue and you can cut. A rectangle. At.

[00:13:24] A square in 50 different fabrics will behave 50 times different. So it’s nice that you can make the pattern correct but as soon as you could it’s from fabric to fabric takes it out far. So it’s such a key thing. And then perhaps how. OK. The body venue fits. You can say okay sure those are big bit too straight. Here’s how you can correct that when you are professional. You can correct if the shoulders are too straight that it’s a little bit too high there. You know that.

[00:14:01] But what a fabric does that’s us.

[00:14:06] Yeah. That’s that. That’s right.

[00:14:09] Yeah. And you need to adjust your pattern to the fabric and if you can’t rely on the fabric. Yeah. Then you can you can use a certain part.

[00:14:22] I think you will you can.

[00:14:24] You can use a you can look at it and you know what you can use from it. You can benefit from it. But yet in a company that also very busy and at the end of the day had to have a pile of work what needs to be done at the end of the day. So I also have not not a lot of time for experimentation and a bit more structure wise.

[00:14:48] What do you think that are actually the key to the skill sets for a company to start working digitally of course having the knowledge of the program but as you already also said that you need to have some personnel who works full time but that helps it goes quicker.

[00:15:08] Quicker by time. But what do you think that would be ideally the case if you want to implement.

[00:15:14] Yeah I think what is the difficulty now with the implementation. There are a lot of people that are in companies in the sort of role they are in a designer role.

[00:15:26] They are in that pattern making role and actually for 3D you need to combine those things together. And from start when we work for Tweedy We saw that everything in our education sort of merge because you needed the fabrics we had more interaction with this lab where we are now.

[00:15:51] Before everything was more so separate sort of going from specialization it’s actually a bit more generalisation. Yeah I know it it’s a bit more as yet. Yeah. Forces again specialize in 3D and in computer software. Yeah but you have to have the basic knowledge of everything you have.

[00:16:11] You need to have some basic knowledge of fabrics and because you are also stitching garments and what they did in the industry. The stitching the garments. They had a lot of experience because you could stick something in 3D but you if you want to stitch it in reality in physical garments you need to stitch everywhere tapes you know if you saw fabrics correct. You also need to stitch those tapes in a treaty because you will also stretch your material if it works. Correct. So you need to have so much knowledge that you find that in one person.

[00:16:47] So you see that the people in it the people working in companies they have their own specialties and a designer doesn’t go work with a pattern in the past.
If you go into the higher segments and they have often merged those things more now and then you are and then you are more the pattern maker is more designer had because the pattern and the styles are more designs. If you are going into the mass market then it's very straightforward and then it's really in. People working in silos. And that is not possible anymore. I heard from a company large company they are working already for a long time between the they have and one side's the very nerdy pattern maker one a few very or one. I don't know how big their nerdy pattern maker at the other sides. They have creative designer and then to have a large group of people in between and they blend those skills and that works very well. At CES said to me and. They are also free to choose which fits so far. They want to work some to work that's glow someone that it's OK to tag someone to work with GABA some brows wear so they have also different applications but that very big and for them it works well. I don't know. I think you will get a hiccup in factories if you have all those similar patterns. So that's also where you think of that they might not have rolled it out completely efficient because if you work efficient you don't want to confess your pattern so often because that's from the 80s we work in the industry with 2D patterns and all the conversions. It's chaos because you lose a lot of data. I've seen that. There were patterns which were completely linked out to made it you save a lot of time when you make for instance where you work with lecture habits. Also in a lot of other programs you can link everything your parents had so you can save a lot of work. If you start a lot of done automatically but you can still master the fine tuning what you want to do. What is important and all the verified pieces go ultimately but as soon as you convert this to another software it's lost because they don't work with that principle and you lose all your efficiency.


[00:19:47] So in that way it puts the carriers in front of the horse.

[00:19:54] Yeah.

[00:19:56] And I don't know how long it will take. Perhaps they need to merge some company STATS some are taken over by others because what you wear in the industry they all work. It's the at least Gerber optic tags Elektra and this sort of minority applications. So you have all those conversions are you going to make the whole pattern again. By factory as opposed to you have to team from the people who can toggle between all those top roles.

[00:20:37] And I see it with our students. Our students are able to do this. Yeah some managers are able to add to your creative patterns to really develop to the treaty that they're not so good. It's bad on driving but some improve in that and some designers are really good at it.

[00:20:59] They can really they could really fit in the fertile tailoring role and but if you already work for 70 years in the company as a designer making a technical drawing send it to China. How are you going to work that is what. I saw. I think they're also slowly slowly have to replace those people. And yeah if today if the fashion goes that fast and they need to have done at the end of the day. So many things out or develop a new collection. It's three weeks takes time. Yeah. It also takes time to sell. I think that there should be different strategies for this. Perhaps in some companies you can start with a small team boost starting with this. Are you a loyal aides and that it's increases slowly slowly or you say Okay now we are going to I think when you when you look in those very specific roles and I think a better maker. They easily say Oh either don't like it or it's not accurate enough. I'm not sure how it is now but in the past I've seen a lot of pattern makers who are very defensive. I even gave ones training or a lecture in Sweden and a very little of pattern makers and they're really blocking it. I think it's it's changing now and.

[00:22:45] It's funny because it further makes it. I've met are actually pretty open. Yeah at 3 am now.

[00:22:52] At. Perhaps it's changing. Also also maybe a few years ago. I hope so because it's really important. And they also see that a need to change bits.

[00:23:03] They were really defensive and it is more work and it depends. I think at perhaps yeah someone is more open to those changes than others has some day.

[00:23:18] Only then when when the water was there that day the next day they switch and other stay.

[00:23:26] They just start and they they they they they started with it.

[00:23:31] But just this is a trigger to have those people are here. Why do you think is a trigger to to make them
convert. Because I could maybe say that you maybe a believer in 3D and some are actually not. Yeah I've met several students that I'm free as well who are not and some. Yeah as professionals. Yeah.

[00:23:51] So maybe maybe it really is black and white the you the believers in the nonbelievers. But what would you say that is needed to trigger those because I think he was an advocate for her for working with 3D. Yeah.

[00:24:02] Yeah sometimes. Sometimes time is needed but I also have arguments with teachers. I'm free Who. Will work manually and who don't want to switch to the utility pattern drawing even that's small step. If you look at how old fashioned the entire education system is the industry is working since the 1980s with to the digital patterns and students even though no debts they had V.

[00:24:40] Um Phoebe are a little bit forefront of it is so that's why it was easy because we have the data apparently drawing to switch to 3D if we didn't have it. It was very hot. And.

[00:24:55] So that's I think one of the first things that's. Yeah. You need to start an early phase for things. And even if there are some people even if there are few departments. Yeah i don't know. I see also it's companies like Audi does that it goes from now there are still departments which are completely not working in that way.

[00:25:22] They sometimes have little islands in the picture but told me from about Nike's that they also compete with each other in a way that they don't share their knowledge.

[00:25:36] So a specific team in India won't show said and those with the with the team in England just because just because they're a bit competitive to each other but that's maybe also a company vibe of course that has been created by such and making. Yeah. And that's that's a contradiction almost. Yeah.

[00:25:56] I worked for Hugo Boss and the company was very close by that time and to the outsiders and they are also always at API and there were I just I I spoke a lot with them about these problems last time that presentation were very open and check in. I also called to shoot and we did a graduate's graduation at Hugo Boss internship graduation combination and she worked with CLO and there and then the leader of the treaty transformation gift presentation at.

[00:26:41] as he was so open how they approached everything that was really very I believe he was still so worked still with as he said there was they let the department a little bit free because his some departments assist works better in other departments CLO works better and they are always super organized so they also pick up the measurements. I remember when I was working there they had the whole department. I think it was little. Yeah let's say not this side of the room a little bit smaller for fuse only fuels.

[00:27:21] There was one person responsible is responsible for that the test that's everything for us came first to us and then we went to the designers and they were approving what happened to the fabric when it was fused because you change your fabric and you bought that fabric and then you put a fuse there. You need to think what you put on it. And so I think they have set up now.

[00:27:47] A whole departments for testing the fabrics. And one day I asked them what they did with the different measurements they translate the measurements. If you have a mathematic or physic person they will be able to translate between those Unity's and sometimes perhaps it is not possible but I think you can find a way to do so now. So they sort of solved that measurement but they pick it up very professional and they have a team in-house will explain and they are sort of that day they support the. The software so you can if you have questions they train their employees and if you have questions you can go there. So it really is. Yeah. They'll organize so I think that's one thing you need to do you need to organize it. But if you are in a smaller company then it's more difficult to organize. I think you'll have some very enthusiastic people will push it but they also can be pushed back Yeah because I'm very aware of it. I always try to train our students at to make the change too. I always say to be to be change maker that's. Yeah. Back to me to only people who say I just from school and the system I do it already.

[00:29:24] And what I saw with the video to the when I was working in the company's I was always coming from top down and at 18 and they wanted from bottom up change and they go very slowly today. But they say young people need to work with it. I love discussions with them.
but now also in a transformation and I also saw people
who left who couldn't make the change but didn't want
about did you tell.

[00:30:00] And I think that will be the same for for treaty.
And there still will be jobs for people who want to work
manual labor pretty sure and one last question.

[00:30:10] Yes one. So actually what you already said
about I'm free is that what do you think actually that
are the skills and tools that we should teach now in
the coming years when we are heading to watch more
digitally focused workflow in the fashion industry I think.
That's one of the writing knows.

[00:30:31] What do you think are there the future the
future skills. Yeah we are always basically that's wise
and. Perhaps we can do a little bit more to prepare our
students to make the change that to be changed make
how they can prepare for that debts and. I think we
should do more separate measurements because that's
such a key thing. But everybody is going looking fairly
quick at the nice thing that it is nice. But yeah if you really
want to use it the speaker should also be the practical
side should be important and you need to be aware we
are always looking at this kind of logics had before we
were making our own avatars. We try to look the whole
time what is happening. We always go to P I and we are
very often.

[00:31:43] The persons who are questions but questioned
by other schools. How do you do it. How can you do it.
Gay outputs. So we are sort of informing all that but we
also try to learn from companies who do a lot of things
already.

[00:32:00] Idiots. As we old always tried to figure out so
I think that is important and we have discussions. It's
unfair to do more. Earlier the tweedy starts earlier. But
you have to learn so many things when you are students
and if you sometimes look at people in industry they
also never learned it at school. And so I think if you
learn a student to be have an open attitude towards
development. Yeah that's always good. It's always good.
Always be an older man. When I was young this was
also not there and it came. It came across and yeah I
also jumped on the train so I also had a colleague in
the network that's articles. When I did a transfer from
manual into digital he was 56 and that was he could
also give us another colleague with the same age and
see. Okay. I don't want to do it anymore but he just went
for it and and afterwards I left. I can see you can bus
and he also left at the same time with me and after his
retirement he was still busy with this. So you're never
too old for it. I think that's that's a bad excuse and. It's a
lot about attitude. It's a lot about attitudes and also you
need to invest time. Yeah. Yeah I think time is.

[00:33:40] But that's not about the students. I think for
the students the attitude is important. Yeah in the sense
that.

[00:33:48] I don't want to do it. Yeah. No.

[00:33:52] Perhaps they. Then I always think okay we put
a seat at your head.

[00:33:58] Yeah. I noted that you noted is important and
there will be a day that you think okay.

[00:34:07] All right. Okay. Thank you very much. You're
welcome.
Appendix 4
Manuel, 3D Designer at CLO EU Office
Interview conducted via email on 2 April 2019

What is it exactly that you do as a 3D Designer for CLO?
As a 3D Designer at CLO I give trainings and presentations + build assets and support customers - be aware it is different from a role as a 3D Designer in an Apparel Company.

What were the reasons for you to become a 3D Designer, what where the drivers for you to work in a digital environment?
My past work was split between crafts and technologies - now I used the opportunity to explore the field that is currently very interesting to be a part of.

When working together with a client, do you experience any limitations working with the digital software compared to the client’s needs and expectations?
The needs and expectations vary greatly - when have designers expectations ever been met? It is better to see it as an evolving technology, where it is important to understand the capabilities now in order to understand where things are going and what will soon be possible.

What are the challenges you face when working with a client on social level, how well informed are new clients?
People know about 3D now, at the first contact they are quite impressed with what is possible. The younger the people the easier in general they will adopt this new technology.

What do you think is the ideal new digital workflow when working with CLO?
Visit a brand called www.ATACAC.com - that is 100% digital, with own factory.

Where do you see the potentials for working with 3D software for companies who do not work yet with a digital workflow?
Same as last mail - less samples, sell before produce, lower return rates for online shops.

What are the tools and skill set you think are required to set up a digital workflow?
Pattern making, Rendering softwares, some programming for online fitting API.

Appendix 5
Ineke Siersema, Teacher/Researcher at Amsterdam Fashion Institute
Interview conducted via email on 19 April 2019

What is the general reaction when you tell fashion professionals you teach 3D virtual prototyping?
How interesting, looks great, would like to learn it, is it real? I notice that slowly it starts to be taken more seriously. Digitising is still hard for a major part, just as it was when Illustrator and Photoshop were being introduced. It took a lot of time for the industry to adjust.

When giving lectures to people from the fashion industry about 3D virtual prototyping. What are the reactions regarding this new working method?
Interesting working method but how to implement his? People see as if it fits smoothly in the current workflow that it is interchangeable. But that is a big mistake because processes will change by the implementation and you must be open for this in order to do so. Change management is needed.

Why do you think only recently more companies are getting more interested in 3D virtual prototyping?
Because good practices are shown nowadays, and people need that to dear to take the step. And the hear that it saves money and time, then they want go for it. When 3DVP was arising and when I learned it in 2007 the recession came and limited the possibilities to start working with it. They did not know wat to expect from it.

What do you think is the best digital workflow when working with 3D virtual prototyping?
Depending on the user, the company? Using one software, using more?
I think, with all my experience in diver’s software 2D & 3D:
1-Visualisation end products for communication/branding and sales: Use CLO3D-import patterns, stitch -simulate-optimize-animate-place in environment or/ and make VR experience-online or events
2-Follow-up collection: Build up a library of digital garments —The use 3D modular system to make quick changes/additions in garment parts, fabric, details, finishing’s, prints-(CLO/Browzwear)—visualise for online promotion and sales--s digital to manufacturer.
3-Special Designed collection from scratch with company patterns—create new changes—simulate—
render—promotion/ produce on demand—1- print patterns and cut/make garments for fit and then send out for production.

What tools are needed to create a digital workflow?
User-friendly software with multi possibilities for design, production and branding, for me that is CLO

What skills are required to work with a digital workflow/3D?
Digital skills/& interest, Future Mindset and, depending of the use/target: 2D-3D thinking, pattern skills, feeling with fabrics, prints, details and style (depending on you place in the process, for a brander less important, then you need branding skills/ ideas—), management skills.

What are the limitations of working with a digital workflow/3D?
That because of time saving all must become superfast fashion—-That the whole company needs to understand what is on and that is difficult— training needs to be done by more than 1 person and this takes time— to read the 3d files is different than reading normally 2D files or the real garments, takes time to learn— different mindset as well—New job roles are coming in like a 3D designer

What are the potentials working with a digital workflow/3D?
Disciplines work together more easy, there is more info visible in an early stage/process— Time saving—cost reduction, only 1 ore no samples, sustainable—better branding—produce on demand— online fitting digital, less returns, new disciplines work together and new roles are created— Full 3D production AR/VR—

What is needed to trigger non 3D-believers in the fashion industry?
Prove that it saves them time and money that’s all. And that they will be prepared for the future, and that is now. Ask companies that are transparent /open source, as ATACAC to contact so they can learn from them. An of course, take our students as interns or as graduates to start up new processes— that happens with a lot of companies since the last two years. AMFI is one of the main suppliers of digital fashion students.

Appendix 6
Merja Lamberg, Designer at Basic-Fashion OY in Finland
Interview conducted via email on 13 May 2019

What are your reasons to think about starting to work with 3D virtual prototyping software?
- I am interested if use of 3D could really shorten the sample processing time.
- My next task will be making both designs and instructions/measurements for ladies wear casual collection. Timing would be just correct.
- Want to have a new skill.

What does 3D design mean to you? Where do you see the possibilities and limitations?
- 3D is already used in ahead - going companies
- Could be useful in sample processing and sales
- The biggest limitation on suppliers’ side would definitely be lack of money to invest to 3D software and 3D staff.
- Customers should adopt new way of buying styles, 3D instead of 2D.
- 3D styles could be well used in customers web shops, no photo shootings needed

When searching for more information about 3D virtual prototyping, what information did you find and where did you find it?
- When I studied in University of Industrial Arts in 90’s, we had one 3D Software there. I noted it, but found it too slow and complicated, no patience for that at all.
- I know the founder of Helsinki based company called Stereoscape. I have been very impressed of their skills of using 3D in multiple ways, realized 3D’s great and needed possibilities in industrial design use as well as in marketing field.
- Some years ago I got an idea for 3D fashion app for B2B use, left as an idea stage.
- I have participated in some lectures dealing with 3D. For instance, when Lotta Juring from Adidas was visiting in Aalto Yliopisto
- After hearing her, I found out the software called Clo3D.

What information did you miss when searching for in-depth information about 3D virtual prototyping?
- What are the software and technical equipment’s ( hardware) needed on suppliers side, to get the patterns in use?
- What are the technical requirements for 3D working well in present my laptop?

- It would be good to see what the real, actual advantages of 3D are compared to 2D. Seen on numbers, actual results on time saving for example. Not only nice promoting talk...

- What are the costs of 3D software? (However, Clo3D costs found quite easily)

How would you like to be informed about 3D virtual prototyping, regarding the basic information and the implementation?

- Short written info + video would be great!

What is the vibe in your office when 3D virtual prototyping is being discussed, how do colleagues and managers react?

- Managers do not believe on it yet. They do not clearly see the possibilities for easing the processes. I would like to open their eyes!

My colleagues understand better, although they don’t have any experience with 3D.

What is your current workflow, and what do you think you need to be able to start working with 3D design? Both on software/hardware level and new to learn skill set?

Would like to start studying 3D soon, just need the software. Definitely will suggest this to our manager. If not ok, then sooner possible I want to get one light version even to myself personally. Then monthly fee + hardware.

Self-learning, practising, webinars, lots of patience...

When working in your current job role, how would you like to implement 3D software in your current workflow?

- in practise, starting with even one garment, to learn the software use

What would be your ideal new 3D design workflow?

To test and find out the possibilities of 3D in daily fast-fashion B2B design work.

To convince managers. To keep my own ambition and professional ability high!