

# **INVESTIGATING EFFICIENT WORKFLOWS: INTEGRATING AI AND FASHION DESIGN**

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## 1 / ABSTRACT

This thesis investigates the potential for integrating generative artificial intelligence (Gen AI) into the fashion design workflow to streamline mundane and time-intensive tasks, thereby augmenting designer efficiency and creative potential. The primary research question explores how Gen AI can be effectively implemented as a collaborative tool across key stages of the design process. This includes phases that are critical to the designer's workflow, such as trend research, creative direction, mood board creation, color palette development, preliminary design, technical sketching, and, most significantly, pattern making.

The methodology for this thesis consisted of a series of controlled experiments using a selection of both design-specific and non design-specific Gen AI tools. There were a total of 6 Gen AI tools that were selected, which allowed the experiments to explore a breadth of tools, while also ensuring a depth of understanding the capabilities of the selected tools. The final tools selected included ChatGPT, Midjourney, The New Black, DeepSeek, Adobe Firefly, and Vizcom. Each tool was tested against specific tasks within the design workflow and evaluated on criteria of required human involvement, ability to reach intended goal, creativity, ability to reach aesthetic goals, and ease of integration. The technical feasibility of AI-generated flat patterns was further validated using CLO3D software for virtual prototyping.

The results demonstrate a clear disjunction in Gen AI's current capabilities. The experimentation found that Gen AI excels

in conceptual and ideation phases, proving highly effective at generating narrative-driven creative direction, synthesizing trend reports, and developing color palettes with precise Pantone references. However, its efficacy diminishes significantly as tasks require greater technical precision. AI-generated visual assets such as mood boards or design images may serve as powerful inspiration but often require extensive human intervention in order to properly develop the garments. Crucially, the technology fails to produce directly applicable technical outputs. In design terms, this means that it cannot generate manufacturable technical drawings or accurate flat pattern diagrams on its own. A key finding was that while Gen AI cannot create finished technical specs, it can act as a knowledgeable assistant by providing detailed textual instructions and measurements that significantly accelerate the human pattern maker's drafting process.

The study concludes that the optimal role for Gen AI in fashion design is not in automation or replacement of the designer but in augmentation. The proposed framework labels Gen AI as a tool for handling the preliminary, data-heavy tasks, freeing designers to focus on high-level creative direction, critical decision-making, and technical refinement. The outcomes indicate that this human-AI collaborative model may streamline workflows, reduce time spent on mundane tasks, and enhance creative exploration, though it currently falls short of replacing the expert human touch required for precision-based design and production activities.

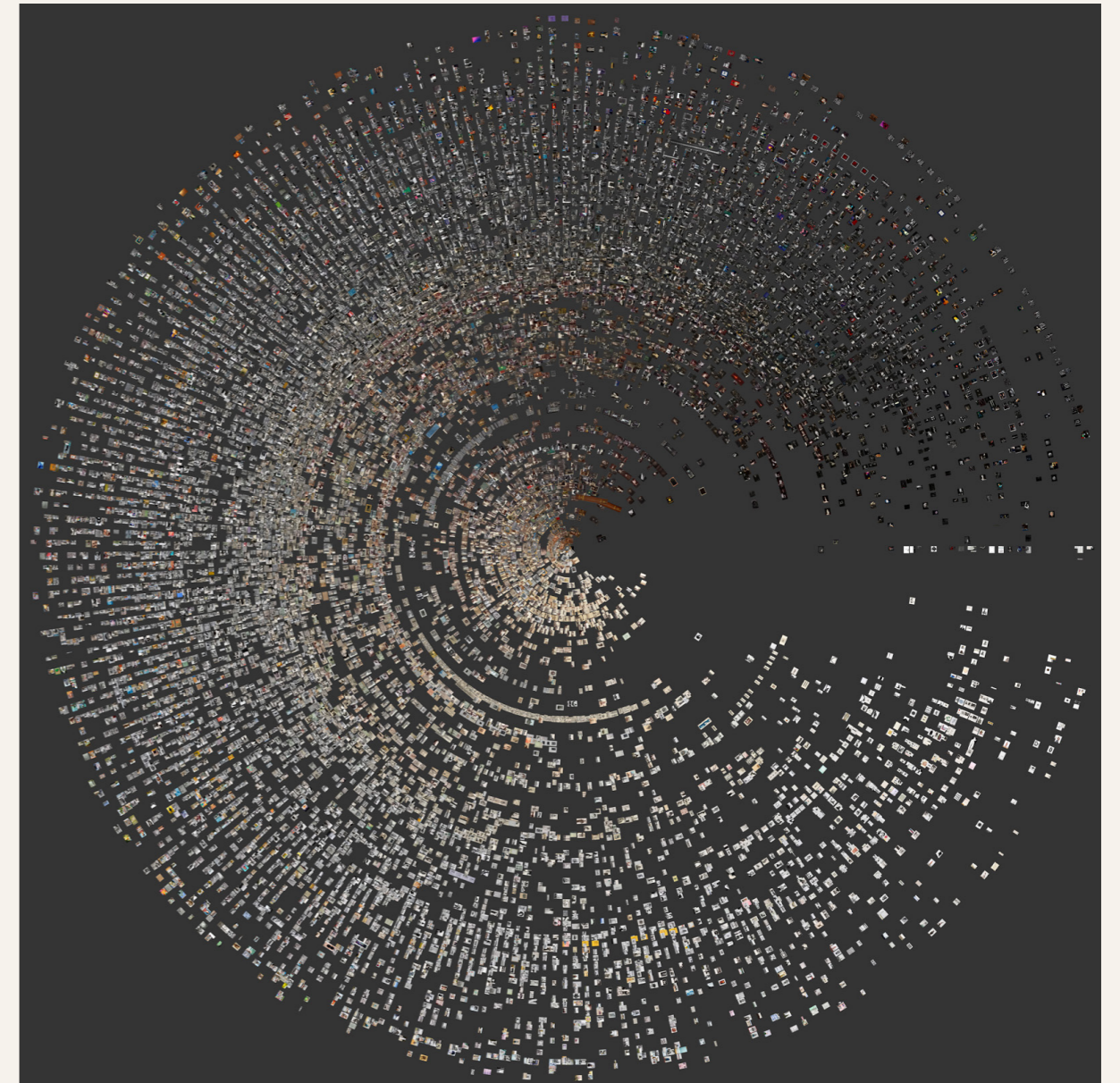


**Figure 1**  
AI-Generated Runway Image  
(Mabille, 2026)

## 2 / INTRODUCTION

As technology moves forward, fashion follows suit. The question is, how? Fashion designers in the 21st century need to learn to utilize these technologies to avoid the risk of falling behind the times. In order to properly expand their power, creatively and technically, designers must adapt and adopt the nascent technology. The rise of Gen AI raises questions for many, and rightfully so. To fully understand the role that Gen AI may play in our creative futures, we must also understand the complex relationship between a designer, creativity, and technology. The relationship between fashion designers and their tools is a dynamic one. In today's technological age, the software and technology available to designers is ever-evolving, pushing creative boundaries faster than ever before. The invention of artificial intelligence, however, is not simply a new tool, but a fundamental shift in the way we create. As media theorist Lev Manovich observes, we are moving from a culture of creation to a culture of "curation, selection, and configuration" driven by our algorithms (Manovich, 2018). In this new paradigm, the designer's role is shifting from a sole creator to a director, curator, and creative director of traditional and AI-integrated workflows. The creative process becomes a dialogue, where the designer's vision collides with the

AI's capabilities and its inherent biases. These biases are inevitable, as they are shaped by the vast datasets on which it was trained. This relationship between the designer and the technology raises a key question for fashion: how can designers maintain their unique aesthetics and critical perspective while leveraging the power of generative AI? This paper investigates this precise question, alongside others, to explore how AI can be integrated into the fashion design workflow to assist rather than automate creativity. In many ways, it aligns with Manovich's (2020) concept of "AI aesthetics," which analyzes new visual languages that emerge from human-AI collaboration. Manovich's research is grounded in the idea that AI will be a fundamental shift in our aesthetic culture. He does argue, however, as this paper will further discuss, that AI models lack human-like discernment and taste, requiring human-intervention for best results. In *AI Aesthetics*, Manovich makes the point that one of AI's great powers is its ability to automate. His career has been full of examples of how this automation may be harnessed for further acts of creation. One example of Manovich's of utilizing quantitative computer analytics in the creation of art was named 'A View from Above: Exploratory Visualizations



**Figure 2**  
Manovich's example of early data visualizations with the aid of quantitative computer techniques  
(Hochman & Manovich, 2013)

of MoMA Photography Collection', which featured varying visualizations of 18,941 photographs from the MoMA photography collection. The project, completed in 2013 is an early example of how computer learning may aid in the creation of something new and meaningful with the guidance of a human's creativity and vision.

In the fashion world, AI's sheer ability to produce may be harnessed by strategically offloading certain procedural and data-intensive tasks, such as trend analysis, color palette generation, and technical drafting, to AI, so that designers can focus their expertise on other, more creative tasks. These may include higher-level conceptualization, critical judgment, and narrative development, to name a few. This study does not approach AI as a replacement for human designers but as a nuanced, collaborative relationship between the designer and the Gen AI. By systematically testing a variety of Gen AI tools across the design process, this thesis aims to develop a framework for a Gen AI-integrated fashion design workflow. It also aims to establish best practices and consider the relationship between the prompts a designer may give and the results that will be generated in return. It is the goal that the developed workflow is one that can harness the speed and scale of Gen

AI while remaining firmly guided by the designer's artistic vision and intelligence.

How will designers begin to integrate this technology into their design processes, without eliminating the need for them altogether? First, it is critical to understand the technology behind Gen AI to better understand how it may be utilized.

Generative artificial intelligence, also known as Gen AI, is a type of machine learning. In its early creation, machine learning was essentially pattern recognition, it was able to recognize patterns based off of large, complex data sets.

And in doing this, machine learning was able to make predictions. Gen AI differs in that it can create entirely new data, such as text, pictures, or videos, based off of the data that it has been trained on. To utilize these models, the user of the Gen AI must input data, or a command for the Gen AI to then create the new data. These inputs may be text, images, or a combination of both. Typically the user may also choose the output, such as images, text, videos, renders, or other formats. Certain models may also allow the user to choose specific variation techniques, such as image dimensions, speed of the generation, or aesthetic qualities. Many models also allow the user the option of editing their outputs for further generations. The selection of these factors may allow the user to have

better control over his or her results, creating outputs that more closely resemble what they are attempting to create.

This human control is a critical factor in the usability of these models. Models are trained over vast swaths of information, and so it can be very difficult for them to regularly produce useful results. However, to be utilized in real-world applications, the AI must reliably produce efficacious results, which currently requires human control over outputs.

In understanding that Gen AI can generate entirely new outputs, the possibilities of using Gen AI in creative fields, namely fashion design, are then seemingly limitless. From the generation of images for mood boards to the conversion of sketch to render, a high-functioning Gen AI can assist in much of what the designer may need on a daily basis.

To fully understand these possibilities in the context of fashion design, we must first lay out the current apparel design workflow, from creative direction to final collection. This thesis will focus on a broad approach to the fashion design workflow. It is more general, focusing on the building blocks, or foundations of the fashion design workflow, rather than a specific designer or brand's approach. After laying out the AI-integrated workflow, the experimentation will begin. During the experimentation, an entire collection is

developed with the assistance of AI, via the proposed workflow. In doing so, the efficacy of the models will be tested and rated on a scale of 1-5, with 1 being the worst possible outcome and 5 being the best. Different methods of inputs, such as text, images, and combinations of both, will be tested as well, and outlined within the different softwares.

This experimentation aims to answer a number of questions tied to the heart of this thesis, with the key question being, "How can Gen AI be effectively integrated into the established fashion design workflow to streamline mundane tasks, thereby augmenting designer efficiency and creative potential?" In the research, a variety of Gen AI tools were tested, with their results then being rated on a key criteria that may assist a designer in understanding the opportunities and shortcomings of a specific tool being used on a specific task. The rating system and criteria will be explained in greater detail within the paper. The experimentation will investigate the potential for integration of AI tools into the fashion design workflow, exploring both the possibilities and limitations of the AI tools at this time. In addition, it will consider the role that these AI tools can play, and the relationship that the designer can, or rather, should, take on in order to best use these tools.

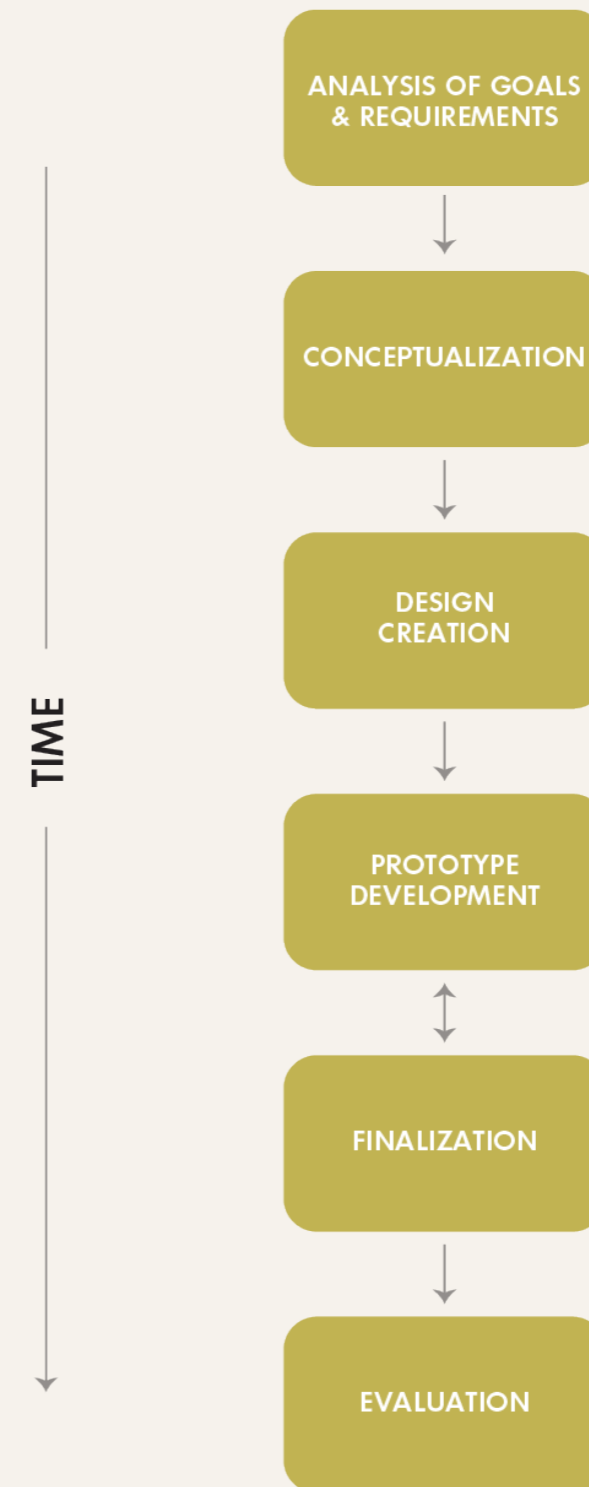
## 3 / TRADITIONAL FASHION DESIGN WORKFLOW

### 3.1 INTRODUCTION TO THE FASHION DESIGN WORKFLOW

Before exploring how Gen AI and other forms of AI may be incorporated into a designer's workflow, it is critical to first understand the traditional fashion design workflow. The traditional fashion design workflow refers to the steps that a designer or brand takes in order to design a collection. In this thesis, we will take a general approach, focusing on the foundations of fashion design, rather than on a specific designer or brand's approach to the process. The traditional workflow refers to a workflow that has been commonly used over the past 10-15 years, without the use of AI in any form. The traditional workflow still includes technology, such as the Adobe Creative Suite, PLM, or other softwares, but when referred to as a traditional workflow, in this thesis, it will mean that no AI tool is being utilized. The traditional apparel design workflow may be categorized into a series of chronological steps, with a cycle of iteration before the final step in the process. The first 3 steps in the process

are analysis of goals and requirements, conceptualization, and design creation. After design creation, there begins a cycle of iteration of prototype development, evaluation, and finalization. The prototype development and evaluation is commonly grouped together in a process known as "sampling". The sampling process varies greatly in length of time and iterations, repeating itself if the product is not approved in the evaluation phase. If, during evaluation, the product is approved, it goes to the final step of finalization. The following section will go into detail on the tasks required of designers within this workflow, and approaches they may take to achieve their desired results (Kim, 2024).

## DESIGN PROCESS OVERVIEW



**Figure 3**  
Standard fashion design process  
(Bertola et al., 2018)

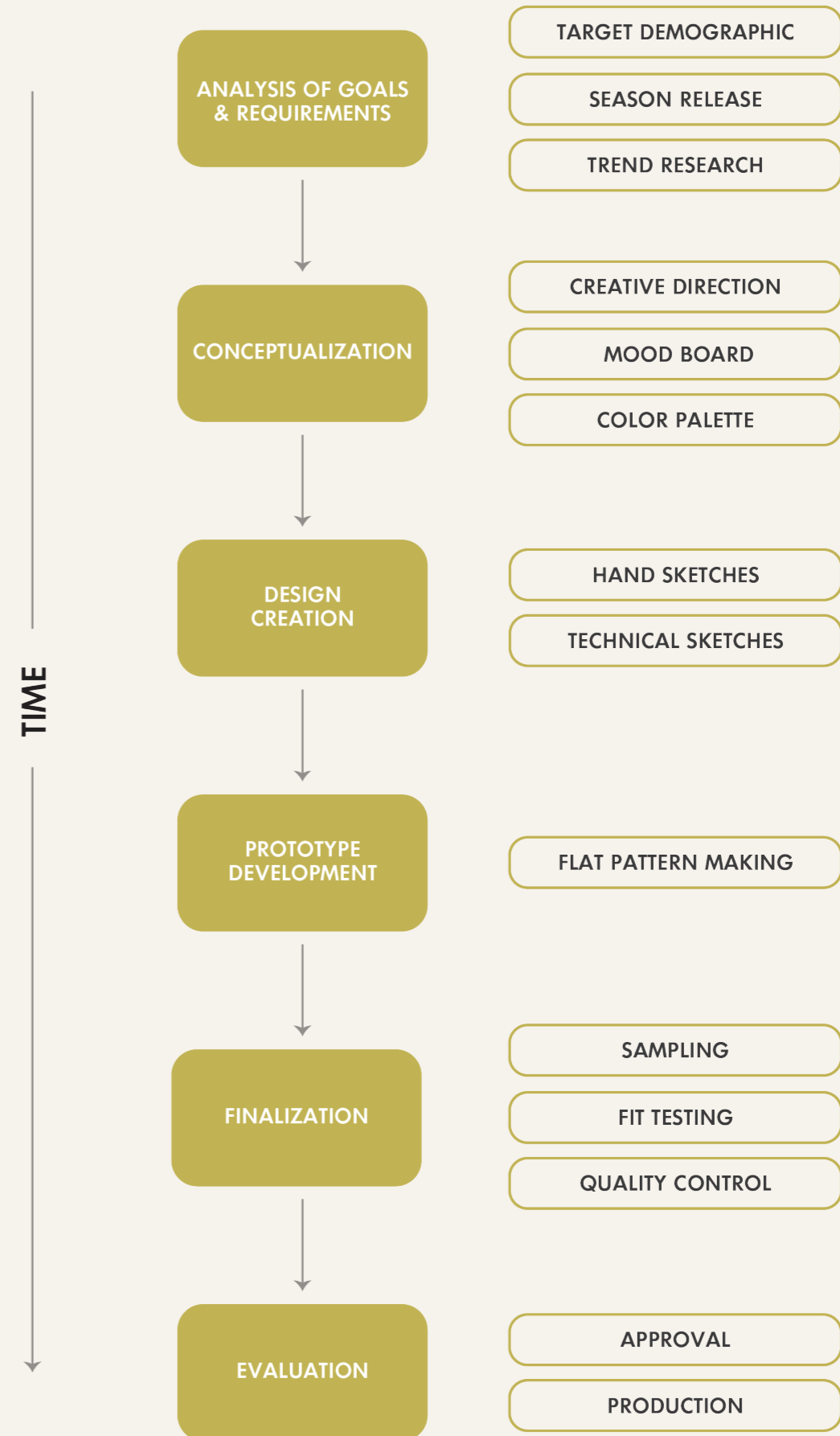
### 3.2 FROM START TO FINISH: THE FASHION DESIGNER'S WORKFLOW

#### ANALYSIS OF GOALS AND REQUIREMENTS:

During the analysis of goals and requirements, designers must consider the target demographic of their collection, along with its focus. The focus will typically include; a season, gender, age range, price range, target consumer, etc. It is important to note, however, that all or none of these factors may be considered when initiating the collection, as modern designers have begun to blur the lines of what it means to design for a particular person or moment, with unisex collections, seasonless collections and more. However the designer chooses to proceed is up to their own discretion or the discretion of their brand, and this is a theme we will see throughout the fashion design workflow.

#### CONCEPTUALIZATION:

Once a focus is chosen, the concept development process may begin. The designer must find inspiration for their collection, often referred to as the creative direction. This can be achieved in an infinite number of ways, through trend research, art, personal life experiences, history, and more. This inspiration will guide the aesthetic qualities of their collection. To visually define this creative direction, designers will collect images, fabrics, textures, artworks, and other materials. These materials will enable them to create a mood board, a sort of visual mind map for the creative direction. Mood boards are most commonly found in the form of collages, with photographs, artworks, fabrics, textures and more assisting the designer in visualizing their concept. The mood board will give direction for the fabrics, silhouettes, and shapes of the garments later in the design process. In addition to the mood board, designers typically select a color palette for the collection. The color palette must reflect the creative direction, season, and trend of the collection, and is most often specified with color codes, such as Pantone's color codes.



**Figure 4**  
Standard fashion design process - Expanded  
(Bertola et al., 2018)

## DESIGN CREATION:

After the creative direction has been completed, the designer will begin to truly design the garments. The most typical way designs take shape is through what the designer calls sketches, flat illustrations of garments, typically shown on a model, also known as a croquis. These sketches allow for the designer to rapid-fire ideas, putting their thoughts to paper quickly and efficiently. This process usually takes the designer multiple rounds of iteration, changing the garment's shape, length, fabrics, or colors. Then begins the process of selecting final designs to choose the final collection. Then, technical drawing begins. Technical drawings differ from sketches in that they are detail-oriented, as they are what the designer will send to the factory to begin the manufacturing process. While sketches may be created digitally or by hand, technical drawings are produced digitally, using software such as Adobe Illustrator, which allows for precision edits and scalable files. Specific components of the garment, such as darts, seams, and correct proportions are critical to these drawings, as they are intended to aid manufacturers and pattern makers in the production of the clothing. If these

details are incorrect, it can lead to major issues within the production system, such as longer lead times and increased waste. This slows production and contributes to heightened costs, causing financial harm to the business. For these reasons, technical drawings are critical to the smooth operation of apparel manufacturing (Choi et al., 2023).

## PROTOTYPE DEVELOPMENT:

Once technical drawings are created, patterns must be made. Patterns are the building blocks of the garments. They are the pieces that will eventually be cut into fabric to create the pieces that will then be sewn together into the final garments. There are two main types of pattern making; draping and flat pattern making. In this paper, the focus will be on flat pattern making, as it is the most common form of pattern making on a large scale. In flat-pattern making, there are pattern blocks, which are generic garments such as a skirt or a trouser that the pattern maker will then edit to fit the designer's direction.

Pattern making is an incredibly complex process, which must take into account the drape of the fabric, the curvatures

and geometries of the human body, and create fits that account for all types and shapes of bodies. This is a skill that takes most years to master, as garments vary widely based on gender, fabric type, production methods, and more. The patterns may be edited throughout the design process to accommodate changes in design and ensure a proper fit. Once the pattern is perfected, it will be graded to fit the size range of the brand, commonly an XS to an XL or XXL .

Another critical stage of the fashion design workflow is the fabric selection. Keeping the creative direction in mind, the designer may choose a fabric for its draping, color, texture, composition, or more. Alongside the fabric selection, the designer must also consider notions such as buttons, zippers, and hardware. These selections, alongside the technical drawings will then be compiled into what is known as a tech pack. A tech pack is essentially the blueprint of the garment, as it contains all the information the manufacturer needs to be able to create the piece. The brand or designer will submit the tech pack to the manufacturer once it is completed, and the process of sampling will begin. This step will not be explored within the experimentation, but is important to keep in mind (Choi et al.,

2023).

## EVALUATION, MODIFICATION, AND FINALIZATION:

Sampling is the process by which a manufacturer sends the brand or designer a prototype of the garment for approval. When the designers receive their samples, they must perform quality checks, including color accuracy, fitting, stitching quality, and construction details. If any of these things are not as intended, the designer will send back comments to the manufacturer. This process is iterative, and will go back and forth as the designer makes comments on the sample, and submits these to the manufacturer for a new sample to be produced. There can be any number of samples created during the sampling process, most typically between 2-10 samples per garment, as edits are made and fits get perfected. If something in the design is not possible due to limitations of the manufacturer, or time constraints, designs may have to be modified. Once the sample is perfected, the designer approves the sample and it gets sent into production (Choi et al., 2023).

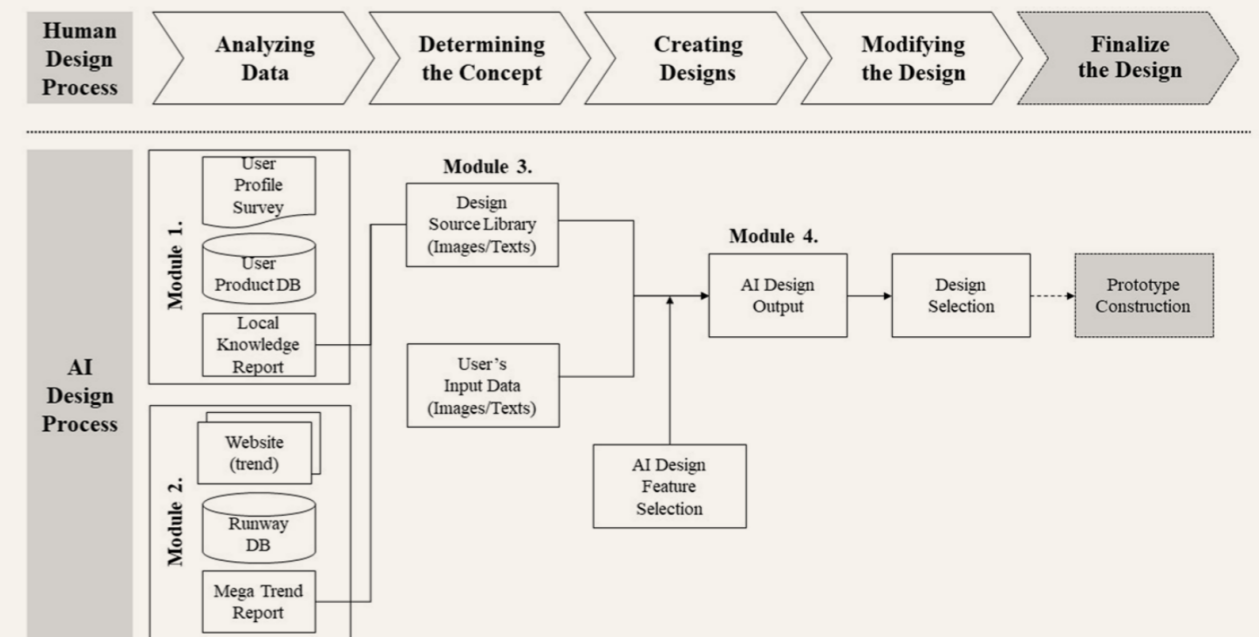
## 4 STATE OF THE ART: AI IMPLEMENTATION INTO THE FASHION DESIGN WORKFLOW

### 4.1 INTEGRATION OF AI INTO FASHION DESIGN

Before considering how to integrate Gen AI with fashion design, it is important to first consider the relationship the designer has with the technology, and how utilizing these tools may shift the designer's responsibilities. The integration of Gen AI into fashion design is a fundamental shift from the established, linear design workflow to a dynamic, iterative process. This shift moves beyond simply accelerating the designer's workflow. As noted by The Frick Collection (2025), AI tools create a "generative feedback loop," where initial concepts can be visualized, critiqued, and regenerated almost instantaneously. This ability completely reestablishes the traditional workflow, from distinct, linear phases of the design process to a more complex and interwoven series of iterations. This non-linear approach prioritizes exploration over predetermined outcomes, which allows designers to ideate on a much broader scale in much less

time. The creative process then becomes less about executing a final, fixed vision and more about exploring a wide swath of possibilities. Designers looking to integrate Gen AI into their practice must understand that it will require new methodology and workflows to ensure proper engagement with the AI's generative logic.

This shift in technology redefines the role of the fashion designer. It changes their function from an isolated creator to a strategic "director of intelligence." The designer's expertise is increasingly applied in framing problems in the form of prompts for the AI, curating its outputs, and infusing the generations with a keen design eye, narrative understanding, and cultural relevance. This perspective aligns with concepts of "co-creativity" in human-computer interaction, wherein the goal is to create systems that augment human intelligence rather than replace it (Dove et al., 2017). In this collaborative model, then, the designer acts as a conductor. Their role is to orchestrate the capabilities of the AI to explore different types of forms, textures, and silhouettes that may not emerge through more traditional methods. However, this is not a passive relationship; the human-to-Gen AI relationship requires a critical assess-



**Figure 5**  
Human design process as compared to an AI integrated design process  
(Choi et al., 2023)

ment of the Gen AI's biases and clear control in guiding the results. Further, the designer must maintain a keen eye for detail and maintain a strong point of view, otherwise risking a loss of their creative vision. Ultimately, this emerging relationship between designer and Gen AI positions the designer as a critical interpreter and editor, whose creative vision ensures that the final product is not just an output but a meaningful cultural artifact. While the integration of AI into the fashion system has not yet fully taken shape, it's projected to grow rapidly in the near future. McKinsey, an American-based multinational strategy and management consulting firm, predicted that "In the next three to five years, generative AI could add \$150 billion, conservatively, and up to \$275 billion to the apparel, fashion, and luxury sectors' operating profits, according to McKinsey analysis." (Harreis et al., 2023). With this prediction looming, considering the implementation of AI into the fashion system is not only interesting but critical for businesses and designers. Preliminary trials of integrating AI into the fashion system have already begun, with designers incorporating the nascent technology into their workflow to produce results ranging from fully rendered fashion shows to accessory and garment designs

that have gone into production. AI Fashion Week, an exhibition shown at New York Fashion Week in 2023 that was put on by Maison Meta, and sponsored by popular clothing retailer Revolve. It is a promising example of these technologies being utilized. In the first season, 350 designers from all across the world submitted collections to be put through a jury of experts, and selected for the final exhibition (FAQs – AI FASHION WEEK! Worldwide AI Fashion Week Made with Artificial Intelligence, 2023). At the final exhibition, 3 winners were selected to have their collections produced in collaboration with Revolve. This workflow is novel, as Madeline Schulz writes for Vogue Business, "Manufacturing the clothes AI is able to generate may be one of the big challenges introduced by the technology. Historically, designers have sketched ideas, produced samples and then shown them to the public. AI Fashion Week flips that sequence so the audience sees a look finished and styled on a model first. Then someone needs to figure out how to actually make it, running the risk of the final garment falling short of the original concept (Schulz, 2023). This step of "how to actually make it" is the pattern-making process, which is complicated in nature



Figure 6

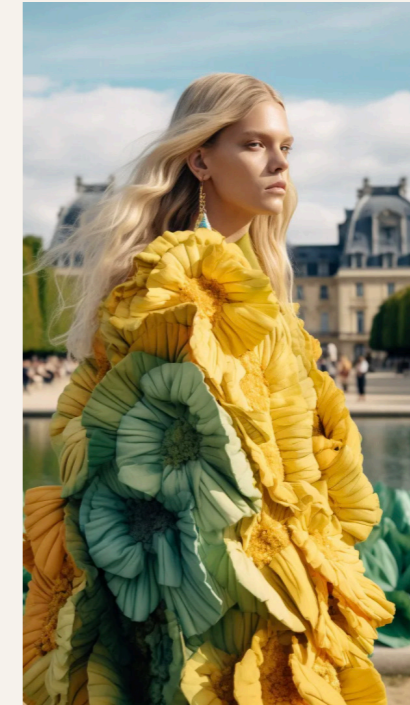


Figure 7



Figure 8

Examples of Matilde Mariano's winning AI-generated looks for AI fashion week  
(SEASON 1 – Recap, 2021)

as it must take into account geometry, physics, and material science to get a garment to the proper fit. As McKinsey senior partner Holger Harreis states, "This is where expertise comes in ... Translating the design into a production process will be needed ... Right now, human intelligence will still be needed in this step ... Parts might be generative AI-supported, but it will stay human-centric for a while." (Schulz, "What to Expect at the First AI Fashion Week."). Acknowl-

edging the limits of AI is critical to understanding its place in the fashion workflow and to better advance the technology to meet the needs of designers. Alongside integrating AI into Fashion Week, established brands are beginning to experiment with how the technology may assist their designers. Puma released their Inverse sneaker on December 7th, 2024, which was designed in collaboration with AI tools. Puma global



**Figure 9**

One of the looks from Lulu Li's AI generated collection for Moncler  
(Li & Moncler, 2024)

creative director, Heiko Desens wrote in a press release, “In our design process, AI is very new in terms of our creative exploration and in communicating ideas ... At first, there was uncertainty, but the fascination and new possibilities have taken over. I am stunned by the granular level of the output, and as creatives, we have a new precision tool to level up our design work.” (Zwieglinska, 2025). As the abilities of AI continue to advance and its capabilities become better tested, its integration into the design workflow is sure to rise.

Another case of AI being utilized within a brand's workflow is the case of Moncler's collaboration with Chinese artist Lulu Li. The collaboration was released in October of 2024, with the goal of using AI to design a 10-piece collection. One point of interest within this case is the discernment that Lulu Li is not, by trade, a fashion designer. Her creation of the collection required great assistance from the Moncler technical teams, as she said, “The tools are really good overall, but when it comes to the details in terms of construction, there was work to be done. For example, there was a piece hanging from the jackets in one of the images, and it looked really good. But it had no real application — I didn't know

what it was. So it was interesting working to figure it out — adjust it, maybe remove it — and still keep the look.” (Kotsoni, “Style vs Craft.”). This issue has come up in much of the discourse surrounding using AI in the fashion design process, as generations may be deemed usable until it is time for the garment's construction to be executed.

## 4.2 AI PROGRAMS BEING UTILIZED IN FASHION DESIGN

Gen AI represents a pivotal shift in the capabilities of machine learning. Distinguished by its ability to create novel content, including things such as text, images, and 3D models, Gen AI learns how to perform pattern recognition by being trained on vast swaths of data. Unlike previous forms of AI, which focused primarily on analysis or classification, Gen AI is fundamentally creative. The technology is capable of producing original outputs that did not previously exist (McKinsey & Company & BOF Team, 2023). Its speed is also notable, moving from

the research phase to widespread public accessibility in a remarkably short period of time. Its major turning point came in late 2022 and 2023 with the release of well-known, user-friendly platforms like ChatGPT, DALL-E, and Midjourney. This rapid development has triggered what many industry analysts have described as a “generative AI explosion,” pushing these tools from niche user bases into the mainstream (Stanford University, 2023).

This integration into the mainstream, including the creative fields, has been rapid and transformative. Specifically in the design industry, Gen AI is rapidly evolving. What started out as an interesting experiment has now emerged as a central component of a designer's toolkit. Its adoption is notably driven by its ability to accelerate brainstorming and iteration, speed up exploration, and generate a diverse range of concepts from a user's simple text prompts. The available tools are ever-expanding, ever-evolving, ranging from general-purpose “foundational models” to highly specialized platforms created for specific industries such as fashion. The following analysis will survey key Gen AI programs, analyzing their intended purpose, models, and specific opportunities for integration within the

fashion design workflow.

With an increasing interest in incorporating Gen AI into the fashion design process, a growing number of platforms are available for designers to leverage. While some platforms are fashion or design specific, such as Resleeve, Raspberry AI, the New Black, Mercer (formerly CALA), and Centric AI Fashion Inspiration, others are not. A few examples of non-fashion-specific platforms designers may employ include Midjourney, Open AI's DALL-E, or Adobe's Firefly. These lists are both incomplete, as new platforms continue to crop up and attract users with unique algorithms and features. The platforms used within the experimentation will be divided into two categories, based on the intended functionality of the AI. The two categories that will be explored are design-specific and non-design specific algorithms.

Five core technologies power the algorithms. They are the CNN (Convolutional Neural Network), Diffusion Models, MANN (Memory-Augmented Neural Networks), GAN (Generative Adversarial Networks), and CAN (Creative Adversarial Networks). The first we will discuss is the Convolutional Neural Network, also known as the CNN, which leverages existing data by extracting features and

making predictions. Diffusion models are another technology that power Gen AI. Diffusion models, which were inspired by non-equilibrium statistical physics, work through systematically destroying the structure of data distribution in a forward-moving, iterative process. It is then reversed, to restore the data structure, which provides a tractable, flexible generative model of the data (Sohl-Dickstein et al., 2015). The next core technology is the Memory-Augmented Neural Networks, also referred to as MANN. MANN works to reduce the errors in recurrent neural network technology by utilizing the output or response of the AI to influence further learning. This technology enables the consideration of user preferences when generating outputs. AI technologies may also generate images through Generative Adversarial Networks (GAN) and Creative Adversarial Networks (CAN). GAN and CAN employ their learning on vast data sets that are publicly available on the internet. Through this learning, the two networks create vast, diverse data through their learning systems and self-reflective models (Kim, 2024). Oftentimes, AI software will use a combination of these models to generate the best result. In many cases, the models will even be used simultaneously, to opti-



**Figure 10**  
Example of Midjourney generated runway image  
(Image generated using Midjourney by  
Alexandra Jones, 2025.)

mize the results for speed, efficiency and accuracy.

In the following section, 6 softwares will be investigated. With the many tools available today, it was necessary to focus on a few, key softwares, that were selected as the most relevant and potentially useful in the specific use case of fashion design. The key criteria that were considered when choosing the softwares to utilize were their intended usage (whether they were design-specific or had a broader, more generic focus), functionality, models utilized, and their potential for implantation into the fashion design workflow. In selecting the tools, it was critical that they contained both generic as well as design-specific LLMs, and visual engines to provide the experimentation both breadth and depth in exploring how AI enhances each phase of the fashion design process. The softwares that will be further discussed and explored are ChatGPT (and DALL-E), DeepSeek, The New Black, Vizcom, Midjourney, and Adobe Firefly.

## MIDJOURNEY:

Midjourney is a highly popularized Gen AI platform, created by an independent

research lab led by David Holz with 20.77 million subscribers in August of 2024 (Pazur, 2025). The software was launched in 2022, and has since been updated multiple times since its inception, to enhance the algorithm and fix bugs as they appear. The platform is available through a paid subscription and can be accessed through two channels, their own website and the website Discord.

**Intended Use: Non-Design Specific Use and Functionality:** Midjourney enables users freedom to generate images of any sort. This capability may be especially enticing for designers in the early stages of the design process, such as creative direction and mood board creation. In order to generate output, the user is able to use the following commands:

- Text-to-Image (/Imagine)
- Text+Image-to-Image (/Imagine)
- Image-to-Image (/Blend)
- Image-to-Text (/Describe)

**Model Utilized:** Midjourney utilizes machine learning algorithms and neural networks which have been trained with expansive datasets of images and text. This training allows the system to de-

cipher and replicate desired styles and elements. In order to generate high-quality, realistic image, Generative Adversarial Networks (GANs) are employed. GANs work by using two neural networks, the generator and the discriminator. The generator creates the images and the discriminator analyzes them with a dataset, which enables the generator to produce results with greater precision (CryptoExplorer, 2024).

**Implementation in Fashion Design:** To begin generating images, users will utilize the /imagine or /blend features. The /imagine feature enables the user to describe the image they want to be generated and also allows for the uploading of reference imagery. The /blend feature prompts users to upload 2 or more photos to generate a new image. During both the /blend and /imagine commands, users may choose to input specific parameters as well, such as the aspect ratio, or style preferences. Generations will then be displayed in 4 preliminary digital images, which the user then have the option of continuing to iterate upon through the variation function. The variation function will allow users to create further generations, adjusting the parameters or prompts to best meet their goals (Zhang & Liu, 2024).

The platform has been widely recognized as one of the best in class, both from academic researchers as well as designers themselves (Zhang & Liu, 2024). During AI Fashion Week, 60% of designers utilized the software during their design process, a testament to its capabilities (Schulz, 2023). It's early acceptance into the fashion design process is multi-layered. Firstly, the program has shown great potential for creating a broad range of images in varying styles, while maintaining intricate details so crucial for fashion design. Secondly, it has shown the ability to generate scenes with multiple characters and objects, which is necessary when attempting to generate entire outfits or multi layered looks (Zhang & Liu, 2024). With that being said, there are also limitations of the software; prompts are unreliable and require a heavy human influence. Another challenge is that despite the capabilities of the variation tool, there are still difficulties with editing final images to match the exact vision of designers.

## THE NEW BLACK:

The New Black is a company based in New York City and Paris, with a commu-

nity of over 100,000 designers utilizing the software (Retouch Fashion Image with AI, 2023). The company is focused specifically on the fashion sector, using Gen AI to perform a range of functions essential to the design process. Through a paid credit system, it's open to public use, giving designers of all levels and skill sets access to its tools.

**Intended Use:** Design Specific

**Use and Functionality:** As the platform is fashion-specific, its tools all cater to meeting the needs of designers. It is important to note, however, that its abilities are therefore limited to generations that are related to the fashion and beauty sectors. Capabilities of the New Black include generating renders of clothing and accessories, retouching images, creating technical drawings, generating models, creating 3D models of garments and accessories, creating textile designs, generating hand sketches, and more. In order to achieve this, the following commands are available for users:

- Text-to-Image
- Image-to-Image
- Text+Image-to-Image
- Text-to-3D
- Image-to-3D
- Text-to-Video

- Image-to-Video
- Image-to-Text

**Model Utilized:** The New Black chooses to keep its algorithms and information on how its models have been trained confidential.

**Implementation in Fashion Design:** By narrowing its focus to fashion design, the New Black offers comprehensive abilities to its users. Throughout the phases of sketching, material and color selection, design ideation, and technical drawing, the software may aid designers. It's ability to quickly generate images and renders allows designers to iterate on their ideas rapidly, making adjustments as needed. In an ever-quickening fashion cycle, this time saved proves itself invaluable. In addition, the rendering tool may allow designers to visualize more clearly what their designs will look like on the body before the sampling process begins. This enables them to make changes beforehand, in turn saving time and material.

One way the New Black differentiates itself from its competitors is through what the company calls "re-touching". Re-touching gives users the ability to take a generation directly from the software and make edits to the image. Such edits

may include adding elements, removing elements, adjusting model appearance, and editing backgrounds (Retouch Fashion Image with AI, 2023). This feature is crucial in that it gives designers a level of control that is necessary for executing their vision.

## CHATGPT AND DALL-E:

ChatGPT, a chat bot that leverages machine learning and Gen AI, was first released in November of 2022 (Palazzetti Romualdi & Monterosso, 2024). It is one of the most notable examples of Gen AI being used on the internet, which notably excludes integrated tools, such as Photoshop's generative tool (Cardillo, 2024). According to online traffic data collected by SemRush and Similarweb, ChatGPT held 54.96% of the market share in 2024, a staggering percentage when compared to the next highest ranking tool, Canva, at 14.92% (Cardillo, 2024). While ChatGPT is a free access tool, there are limits to file uploads, data analysis and image generation, which can be extended with paid subscriptions (ChatGPT Pricing, 2025).

**Intended Use:** Non-Design Specific

**Use and Functionality:** ChatGPT and

DALL-E enable the user to generate text or images based on the input of their choice. In fashion design, this may prove useful in the design stages, such as initial sketching and design iteration. These generations are made possible through the following inputs and outputs, which may be combined or used in solo use as per the user's choice:

**Potential Inputs:**

- Text
- Image
- Video (limited)
- Audio (limited)
- Code
- Potential Outputs:
- Text
- Image
- Data Visualizations
- Audio (limited)
- Code
- Interactive/UI

**Model Utilized:** ChatGPT is based on a conversational model, which was optimized for human interaction through reinforcement learning and feedback from real users. It utilizes a combination of technology to enable its responses, specifically using machine learning, natural language processing, and infrastructure

engineering. On its own, it allows users to input text, images, audio, and videos and receive text responses as output. With the integration of DALL-E, the system can generate images through text input by the user. With DALL-E, the user may generate images from text (Text to Image), modify images (Image to Image), or receive text to describe input images (Image to Text) (Palazzetti Romualdi & Monterosso, 2024). The platform is based on the Transformer Architecture, which has four main components. These components include a Self-Attention Mechanism, Multi-Head Attention, Positional Encodings, and Feed-Forward Networks. The Self-Attention Mechanism allows the model to weigh the importance of words in a sentence in a dynamic way. The Multi-head Attention allows the processing of multiple attention mechanisms at the same time, for a deeper contextual understanding. The Positional Encodings help the model to understand word order because the transformers do not inherently comprehend sequencing. The Feed-Forward Networks enable non-linear transformations to be applied after the attention layers (Vaswani et al., 2017). ChatGPT also integrates RLHF (reinforcement learning from human feedback), which enables the software to

better respond in relation to human preferences (Christiano et al., 2017).  
Implementation in Fashion Design: ChatGPT and DALL-E, much like Midjourney, offer a designer the ability to generate images of all kinds. This may prove especially helpful for the steps of concept direction or creative development when mood boards are being created. It may also aid in the creation of hand sketches, garment and accessory renders, textile patterns, varying of generations, and more.

### VIZCOM:

Vizcom is a Gen AI software that was developed originally targeting the Industrial Design process. As the company has grown, they have expanded to other design disciplines as well, namely in fashion design. Based in Mountain View, California, the company enables designers to generate photo realistic images based off of their sketches and text input. The company emphasizes their commitments to comprehensive security measures, to ensure data protection, content ownership, and reliability. There are both free and paid subscription models, and the software is available for public use

(Vizcom, 2024).

Intended Use: Design Specific  
Use and Functionality: Vizcom enables designers to generate and edit photo realistic renders and 3D models from their sketches. A notable feature of this software is that it incorporates tools already popular in the Adobe Creative Suite, a popular design software, such as layers and drawing tools for increased editing. The tool also contains collaborative features for use in team settings, which will not be discussed in detail, but is an important distinguishing feature of the software (Vizcom, 2024). Generations are created via the following commands:

- Text+Image-to-Image
- Tex+Image-to-Layered Image\*
- 2D-to-3D

\*Layered image refers to files that can be exported either by a single layer or a composition of layers, which enable further editing in softwares such as Adobe Photoshop or Illustrator.

Model Utilized: The model utilized is not publicly disclosed.

Implementation in Fashion Design: Vizcom, being a design specific software, has much potential for integration into the fashion design workflow. Presumably its

most notable feature for fashion designers is its sketch to render capability. This capability could assist designers in visualization, by transforming more abstract sketches into rendered, photo realistic images. In helping to speed up the visualization process, Vizcom can work to accelerate the decision making process in the design phase.

### DEEPSEEK:

DeepSeek is a company that has released many AI tools, beginning first in November of 2023 as DeepSeek Coder. The model we will be discussing is their LLM (large language model) developed Hangzhou China. It is notable for being developed at a much lower cost and with fewer low-grade computer chips (GPUs) than its competitors, such as ChatGPT. Its models are open-source, and give full disclosure of its technical details. By making use of experts, data distillation and reinforcement learning, DeepSeek reveals its reasoning to users in a 'chain of thought' process. DeepSeek is widely praised for its reasoning abilities, and for its unprecedented speed of development (Poo, 2025).

Intended Use: Non-Design Specific

Use and Functionality: DeepSeek works in a chat-bot like format, wherein the user inputs data such as text, images, or audio to receive an output. It can be used for a wide variety of functionality, in many sectors across the board. Users may import a wide variety of files into the software, such as text and document files (TXT, PDF, DOCX, PPTX, XLSX, ODT, RTF, EPUB), code and data files (CSV, JSON, XML, SQL, PY, JS, JAVA, C, CPP, HTML, CSS, PHP, GO, R), image files (JPG, JPEG, PNG, GIF, BMP, TIFF), compressed and archived files (ZIP, TAR, GZ, RAR), and other formats (EML, LOG, MD).

Potential Inputs:

- Text
- Image
- Code
- Potential Outputs:
- Text
- Data
- Code

Model Utilized: DeepSeek is built on a Transformer architecture, similarly to ChatGPT, which has four main components. These components include a Self-Attention Mechanism, Multi-Head Attention, Positional Encodings, and

Feed-Forward Networks. The Self-Attention Mechanism allows the model to weigh the importance of words in a sentence in a dynamic way. The Multi-head Action allows the processing of multiple attention mechanisms at the same time, for a deeper contextual understanding. The Positional Encodings help the model to understand word order because the transformers do not inherently comprehend sequencing. The Feed-Forward Networks enable non-linear transformations to be applied after the attention layers (Vaswani et al., 2017). DeepSeek, much like ChatGPT, also integrates RLHF (reinforcement learning from human feedback), which enables the software to better respond in relation to human preferences (Christiano et al., 2017).

Implementation in Fashion Design: DeepSeek, in the context of usefulness within the fashion design workflow, is best utilized for text generations, as it is unable to produce images. It may assist with any level of written assistance, in tasks such as trend prediction, concept development, color palette descriptions, and more.

## ADOBE FIREFLY:

Adobe Firefly is a suite of Gen AI models and tools released in March of 2023 by Adobe. It is available either through a web browser or directly within different Adobe design softwares, such as Photoshop, Illustrator, or Express. The software has a wide range of possibilities in image, video and audio generation, as well as vector graphics. The vector graphics are notable as they are commonly used within the fashion design workflow in both educational and professional settings. Firefly's integration into the Adobe Creative Cloud family allows it to be easily accessed by designers who already may have a Creative Cloud subscription. One key advantage that Adobe Firefly has over its competitors in the Gen AI space is that it owns the permission or rights that prevent it from infringing on copyright and intellectual property rights. This is critical for professional use, as infringing on these rights could lead to both ethical and legal issues for a business (Adobe Firefly Overview, 2025).

Use and Functionality: Adobe Firefly has a wide range of functionality. It is able to generate images, videos, vector graphics, edit photos, and more by being prompted by a user. Its functionality depends on the channel that the user may be accessing it through. For example, on

the web browser, the user can generate images or videos. When the user accesses Firefly through other softwares, such as Adobe Illustrator, they may generate other files, such as vector graphics.

Potential Inputs:

- Text
- Image
- Text and Image
- Audio
- Potential Outputs:
- Image
- Video
- Audio
- Vectors

Model Utilized: The model used for Adobe Firefly is not publicly disclosed, but it is known that their models are trained on licensed assets such as Adobe Stock and public domain content. In April of 2025 the software began integration with third-party models such as OpenAI's image model and Google's Imagen 3, as well as others.

Implementation in Fashion Design: Adobe Firefly has many potential use cases within the fashion design workflow. Notably, the software generates both images as well as videos. Firefly may assist the designer in the creative direction,

<b>SOFTWARE</b>	<b>INDUSTRY</b>	<b>POSSIBLE INPUTS</b>	<b>POSSIBLE OUTPUTS</b>	<b>MODEL UTILIZED</b>	<b>ACCESSIBILITY</b>
<b>MIDJOURNEY</b>	General	<ul style="list-style-type: none"> <li>• Text</li> <li>• Image</li> </ul>	<ul style="list-style-type: none"> <li>• Text</li> <li>• Image</li> </ul>	Machine learning algorithms, neural networks, GANs	Available through a paid subscription through Discord or proprietary website
<b>THE NEW BLACK</b>	Fashion Design	<ul style="list-style-type: none"> <li>• Text</li> <li>• Image</li> </ul>	<ul style="list-style-type: none"> <li>• Text</li> <li>• Image</li> <li>• Video</li> <li>• 3D</li> </ul>	Not publicly disclosed	Available through paid credits system
<b>CHATGPT &amp; DALL-E</b>	General	<ul style="list-style-type: none"> <li>• Text</li> <li>• Image</li> <li>• Video (limited)</li> <li>• Audio (limited)</li> <li>• Code</li> </ul>	<ul style="list-style-type: none"> <li>• Text</li> <li>• Image</li> <li>• Data Visualizations</li> <li>• Code</li> <li>• Interactive / UI</li> </ul>	Transformer architecture	Available for free (limited) and through paid subscription
<b>VIZCOM</b>	Design Specific	<ul style="list-style-type: none"> <li>• Text</li> <li>• Image</li> </ul>	<ul style="list-style-type: none"> <li>• Text</li> <li>• Image</li> <li>• Layered Image</li> </ul>	Not publicly disclosed	Available for free (limited) and through paid subscription
<b>DEEPSEEK</b>	General	<ul style="list-style-type: none"> <li>• Text</li> <li>• Image</li> <li>• Code</li> </ul>	<ul style="list-style-type: none"> <li>• Text</li> <li>• Data</li> <li>• Code</li> </ul>	Transformer architecture	Available for free (limited) and through paid subscription
<b>ADOBE FIREFLY</b>	Design Specific	<ul style="list-style-type: none"> <li>• Text</li> <li>• Image</li> <li>• Audio</li> </ul>	<ul style="list-style-type: none"> <li>• Text</li> <li>• Image</li> <li>• Audio</li> <li>• Vectors</li> </ul>	Not publicly disclosed	Available for free (limited) and through paid subscription

**Figure 11**  
Comparison table of generative AI tools

mood board, color palette, and sketching phases of the design workflow. It may also be able to generate runway videos of models wearing garments, or 360-degree videos of the garments.

### 4.3 BENEFITS OF THE IMPLEMENTATION OF AI INTO FASHION DESIGN

With the use of these tools, and the ever-growing number of new tools available, designers can begin to integrate Gen AI into their workflows. Utilization of Gen AI offers many advantages, particularly in creativity and efficiency (Harreis et al., 2023). The AI-driven tools allow designers to iterate faster than ever before, testing different materials, colors, and silhouettes in real-time. They allow designers to streamline their creative process while enabling them to have more time dedicated to experimentation and iteration. Merrell, the outdoor shoe and apparel company, has been beginning to integrate AI into their design workflow, and it's being met with support from their designers. As Ian Cobb, senior design director at Merrell puts it, "AI isn't replacing what we do; it's helping us work smarter ... [With AI], we can explore multiple directions without losing sight of what makes our designs unique. It's like having an extra set of creative hands."



**Figure 12**  
Virtually sampled jacket using CLO3D  
(CLO3D, 2024)

(Zwieglinska, 2025). Another benefit of Gen AI is its accessibility. The tools are available on a multitude of platforms, for a range of prices, meaning everyone may have the chance to access these tools. This is a critical feature, as it helps to level the playing field for brands large and small alike. For small brands, with teams that may already be stretched too thin, AI may help to speed up the design process. This allows designers to focus on the most important tasks, while delegating some to the AI, lightening the workload while still completing everything on time (1 Grana-

ry, 2025). Gen AI may also assist in the creation of virtual prototypes. Virtual prototypes help the designer to understand the look and fit of the garment before production and in turn may allow them to make more informed decisions before submitting the tech packs for the sampling process. By incorporating this practice into their workflow, designers may reduce their need for samples, which saves time, materials, and energy. This can allow designs to be put into production faster, which is critical for brands competing for market edge. This may also support a brand's sustain-

ability goals, as reducing samples means less materials and energy waste spent in the sampling process. (Takyar, 2023). In the fast fashion scenario, where companies sell mass quantities for low cost, brands must constantly compete for consumer's attention. For a brand to succeed, it must get to the trends first, with ever-evolving product assortments and styles. This requires a deep-level of trend research, which may be enhanced by AI, which is able to analyze mass amounts of data at lightning speeds. This allows for brands to understand and pivot with their target demographic with precision (McKinsey & Company & BOF Team, 2023). This level of responsiveness is critical for fast fashion brands who must maintain their relevance and meet consumer needs. Beyond the efficiencies in trend forecasting and prototyping, the integration of AI invites a more profound, theoretical shift in the creative process itself. This shift is best understood through the lens of collaborative intelligence, a partnership where humans and AI can work together to amplify each other's strengths (Wilson & Daugherty, 2018). In doing this, the AI acts as a computational engine for its user, capable of processing broad datasets to identify patterns, generate

infinite variations, and perform tasks at a scale and speed impossible for a human alone. The designer, in turn, provides the AI with necessary insights such as creative reasoning, cultural references, and emotional intelligence. Most critically, the designer maintains strategic oversight, to guide the AI in accordance to their own vision and goals. This synergy allows the fashion designer to transition from away from time-consuming tasks such as data-heavy research to acting as a strategic "director of intelligence," a role that aligns with human-centered AI principles where the user remains firmly in control (Shneiderman, 2020). This human-AI collaboration creates a dynamic, iterative creative dialogue. The concept of the "jagged technological frontier" illustrates this well; AI excels at a surprising number of tasks; however, it falls short on others, requiring a human to curate and integrate the outputs into a coherent whole (Dell'Acqua et al., 2023). The designer's key role is not only to curate these outputs, but to infuse them with narrative meaning and guide the outputs toward a coherent vision. This process relies on a collaborative human-AI interaction, where the system provides support that is easily interpreted and controlled by the human expert

(Amershi et al., 2019; Wang et al., 2020). This symbiosis accelerates the design process while creating the potential for a deeper, more exploratory design process where computational power and human creativity can come together to create something greater.

## 4.4 RISKS OF THE IMPLEMENTATION OF AI INTO FASHION DESIGN

Gen AI with all of its potential and benefits, does not come without its risks as well. One considerable challenge regards the legality of copyrights over AI-generated designs. As Gair Sher and Ariela Benchlouch write for the Fashion Law, "Who holds the copyright: the AI system itself, the fashion brand that provided the patterns and textiles, or the designer who inputs the initial parameters? The current legal framework lacks clear guidelines for AI-generated works, leading to ambiguities in copyright eligibility and infringement. This may necessitate a reexamination of copyright laws to consider and

protect AI-generated fashion designs adequately." (Sher & Benchlouch, 2024). When designs are created in tandem with these systems, the legality of who owns the copyright becomes unclear, and with such technology being so new to the fashion industry, the legality of such matters remains unknown. Another legal concern for using AI in the creative process is the potential for infringement of trademark-protected elements. As the software is trained on images that already exist, there is a potential for protected elements to be put into generations without the designer knowing (Sher & Benchlouch, 2024). If used in final pieces and sent to production, the brand may risk its reputation and possible litigation. With this in mind, brands and designers must proceed with caution while using AI to generate designs to prevent the infringement of other's protected designs. If a design is created using AI, it may also be more difficult, or impossible, for the designer to be granted a copyright on the work. In the US, for example, Courts and the Copyright Office have stated that "elements of human creativity" are crucial for deciding whether the AI-generated work may be granted copyright protection. If the designer is not granted this

copyright protection, their work remains in the public domain. This could lead to creatives attempting to mask the role that AI had in their work, leading to ethical risks (Noti-Victor, 2025).

Aside from legal concerns, the usage of AI algorithms in creative fields has been critiqued for stifling creativity and creating a homogenized output (Dufour, 2022). In an industry already under criticism for the homogenization of aesthetics, this is something that could prove to be detrimental. As Brian Baskin writes for *Business of Fashion*, on the current menswear assortment, “[There are] Too many interchangeable brands take the same approach, blending tailoring with casual wear in neutral-toned collections that are stylish but often fail to inspire.” (Baskin et al., 2024). If creativity is already missing in the heart of collections, using Gen AI tools may only worsen the problem. Designers relying too heavily on AI-assisted design may lead to the loss of the unique human touch that differentiates one collection from the next. This could negatively impact not only one designer’s work, but the entire fashion sector as a creative industry.

Alongside the homogenization of the designs themselves, AI poses risks for bias within its representation of humans.

As with all AI, if the datasets that the algorithm was trained on are not diverse enough, the output will mimic that. This poses a particular danger in fashion design, however, as the AI tools may exclude diverse models or perpetuate stereotypes which will lead to a lack of inclusivity during the design process. If not carefully reviewed, generating and potentially sharing images that are inappropriate or offensive could seriously damage a brand’s reputation (Harreis et al., 2023).

As consumers demand more transparency from brands on their sustainability efforts and impact, there is growing pressure on brands to fall in line. While using AI for virtual prototyping may aid in the reduction of waste within the sampling process, AI is an incredibly energy intensive software that also must be carefully considered when implementing into the design process.

In order to train the models, massive amounts of computational power is required, which demands an incredible amount of electricity, which in turn places and increased pressure on the electrical grid and increased carbon dioxide emissions (Zewe, 2025). Once the models are trained, users inundate the software with requests, which leads to further impact.

As models are improved to fix bugs and fine-tune the algorithm, even more energy is required. This energy is primarily being used by data centers, where the models are trained and run the deep learning models employed by ChatGPT and DALL-E. As Norman Bashir writes, “What is different about generative AI is the power density it requires. Fundamentally, it is just computing, but a generative AI training cluster might consume seven or eight times more energy than a typical computing workload” (Zewe, 2025). These energy demands must be met to keep the software running, although Bashir writes “The demand for new data centers cannot be met in a sustainable way. The pace at which companies are building new data centers means the bulk of the electricity to power them must come from fossil fuel-based power plants” (Zewe, 2025). With this in mind, we can begin to understand the impact that Gen AI has on our energy consumption, and where this energy is coming from.

In addition to the staggering energy consumption that AI data centers require, they also require large amounts of water consumption. Data centers holding servers, data storage drives and network equipment generate heat, and so they

must be located in temperature-controlled buildings, to allow the equipment to function properly. To cool the computing equipment, chilled water is used to absorb the heat being generated. It is estimated that for every kilowatt hour of energy that a data center will consume, it will need two liters of water for cooling. With so much energy and water being consumed by AI’s data centers, it’s important for designers to understand the environmental impact of utilizing these tools in their work (Zewe, 2025).

As well as the creative, legal, and sustainability risks associated with AI, there are ethical risks as well. One critical ethical concern is disclosure, and the question of whether or not a designer should disclose their usage of AI, even if not legally required to. While individual opinions may vary, if AI usage is not disclosed, and is then discovered by the public, there may be public backlash. One example of such controversy surrounded Marvel’s 2023 series *Secret Invasion*, wherein shortly after it aired, the company announced it had used AI in the creation of its title sequence. It was widely criticized as being “unethical” for such a large-budget studio to be relying on AI rather than human efforts. Others criticized it for being “lazy” or “devoid of

artistic merit”. This signals a larger publicly held belief that AI-driven creative works are less favorable to human created works (Noti-Victor, 2025).

With this in mind, it is not too far of a leap as to say that not disclosing the usage of AI in creative works could be considered to be deceptive. Legally speaking, this deception may be considered harmful, and lead to legal implications. Aside from the legal implications, however, this could also lead to reputational risk if the deception is revealed (Noti-Victor, 2025).

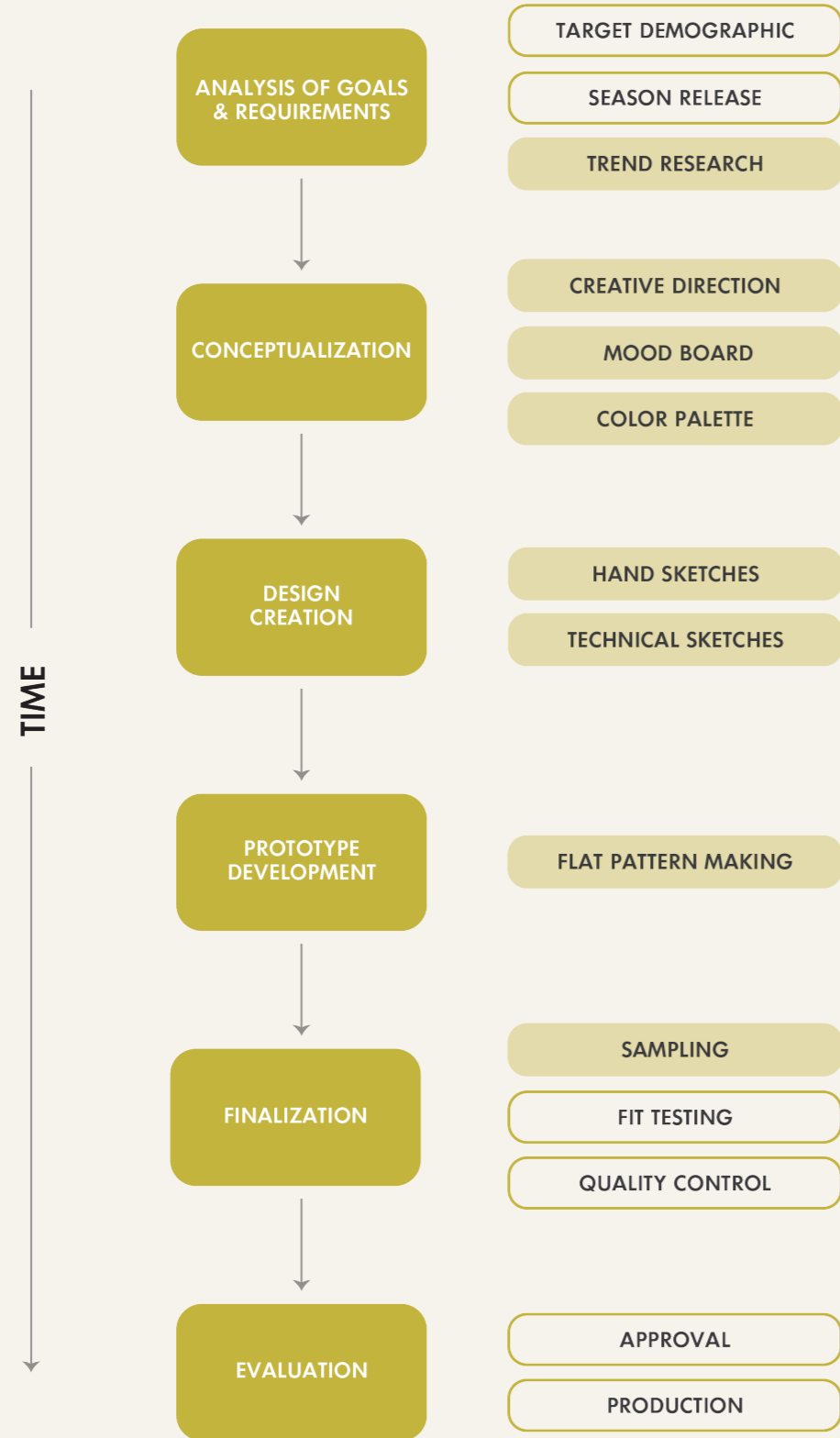
## 5 METHODOLOGY

### 5.1 APPROACH TO AI INTEGRATION

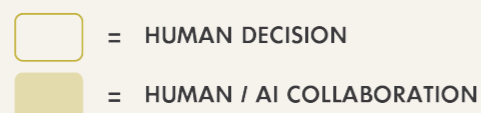
The integration of AI into creative industries is no longer a futuristic concept but a present-day reality, demanding a re-evaluation of traditional methodologies. Its impact is predicted to touch nearly every industry and business on a global scale, and fashion is no exception. In order for designers and brands to keep up with this shifting technology while maintaining creative control and autonomy, there are many questions that must be answered and ideas to be explored. This thesis is centered around the intersection of technological innovation and craftsmanship, seeking to answer a central, pragmatic research question: “How can Gen AI be effectively integrated into the established fashion design workflow to streamline mundane tasks, thereby augmenting designer efficiency and creative potential?”

It is important to note that this question is not born from a desire to replace the designer with an algorithm but rather from a recognition of the immense pressure on modern fashion professionals. The traditional workflow, as detailed in Chapter

3, is a linear yet iterative process fraught with time-intensive tasks, from deep trend research and mood board curation to constant creation of visualizations, sketching and iterating of designs, and finally to the technical rigors of pattern drafting and sampling. These processes, while foundational, often consume resources that could be reallocated at the designers request, fueling the true core of fashion design: creativity, innovation, and strategic thinking. The “mundane” refers not to the unimportant, but to the procedural, data-heavy, and repetitive tasks that are essential yet do not solely rely on human creativity. It is in these areas that AI offers the most compelling and interesting value proposition. The point of view, shaped by the state-of-the-art analysis in Chapter 4, is that AI should be conceptualized as a collaborative tool, a sort of sophisticated assistant that operates under the strict direction of the designer. This human-centric approach is crucial. The case studies of Moncler x Lulu Li and the inaugural AI Fashion Week serve as cautionary tales; they highlight a critical disconnect between AI-generated concepts and their physical realization. The AI may propose a visually stunning garment, however when it features an inexplicable floating



**Figure 13**  
Proposed AI integrated design process  
(Bertola et al., 2018)



detail, it falls to the human designer to answer the practical, and difficult, question: “How is this made?” Therefore, this research suggests that successful integration is not about automation but about “augmentation”. The designer remains the creative director and the final decision-maker, while AI handles heavy computational lifting, rapid iteration, and data synthesis.

The proposed framework for investigation, which guides the experimentation in Chapter 6, is built on this principle of collaborative augmentation. It is rooted in a phased approach, mirroring the traditional workflow but inserting AI tools at specific junctures to test their abilities. In doing this, it explores how AI may be integrated at many different phases of the design workflow. It includes both the earlier, more experimental side to the design process, such as mood boarding, creative direction, and design generation, as well as the more technical processes, such as technical drawings and pattern making.

## 5.2 PROPOSED AI-INTEGRATED WORKFLOW

The proposed workflow is built to provide a feasible, replicable structure to the integration of Gen AI in the fashion design processes. Each larger phase has been divided into the tangible tasks required of designers when creating a collection. For each task, it has been assigned either the designation of ‘Human Decision’, meaning it will not include AI in any way, or ‘Human + AI’, meaning it will include AI intervention at some point in the process. Its broad approach to outlining the design workflow attempts to map the process a designer may use while allowing the designer to decide on the software, tools, and methodologies that they prefer. This was critical, as this thesis focuses not on one designer or brand’s methodology, but rather takes a more holistic approach to the design process. The testing of each phase will create a better understanding of how AI may be able to assist the designer, of its limits and opportunities in the following phases:

## 1. ANALYSIS OF GOALS AND REQUIREMENTS:

This phase tests AI's ability to act as a research and brainstorming partner. The experimentation will ask the questions: Can tools like ChatGPT or The New Black accelerate trend forecasting? Are these tools able to create visual and textual depictions of upcoming trends in color, silhouette, fabrics, etc? How well will these tools be able to recognize patterns across the fashion landscape and creatively propose them to the designer? How should a designer use these tools for trend forecasting?

## 2. CONCEPTUALIZATION:

This phase tests the capabilities of AI to develop coherent, inspirational themes and then translate these ideas into visualizations. It will explore questions such as: Are AI tools able to translate abstract ideas into clear creative direction briefs? Can Midjourney and Adobe Firefly generate inspirational imagery and color palettes that align with a designer's vision, or will they produce generic outputs? What strategies are most effective in prompting these tools to obtain the de-

sired results?

## 3. DESIGN CREATION (AI-ASSISTED VISUALIZATION):

This phase examines the transition from concept to visual representation. It considers: Can AI accurately interpret text-based creative directions to generate preliminary design visuals? How much control should the designer have for the ideal output? Are the generated visuals useful to the designer in terms of inspiration or creativity? Can the software generate realistic renderings of the outfits based on human-made sketches? Can these generations be useful to the designer in the decision making process? More critically, can it transform hand-drawn sketches into technical flats with the precision required for manufacturing?

## 3. PROTOTYPE DEVELOPMENT (AI-ASSISTED TECHNICAL SPECIFICATION):

This is the most challenging and revealing phase, as well as the most novel of all of the tests performed in this experi-

mentation. It moves beyond aesthetics into the realm of geometry, physics, and material science. The core hypothesis here is that if an AI can accurately describe a garment, it should, in theory, be able to deconstruct it into its constituent pattern pieces. This phase asks the critical question: Can AI be used to develop flat patterns?

## 4. EVALUATION:

This phase confirms or denies the plausibility of using AI for pattern making. Using CLO3D to cross-check the patterns that the AI algorithm provides, it creates a digital sample that can be evaluated for the pattern's efficacy. This phase asks the question: Can AI flat patterns be used to produce samples? To what level do the patterns proposed by AI require human intervention?

In summary, this research operates on the belief that the future of fashion design is not a choice between human and machine but a synergy of both. To resist the technology altogether is to resist an inevitable tool, however to replace the designer entirely would be to lose the true art of the field. History has shown us that technology has a way of integrating

itself into nearly every piece of our lives, and so the question is not if AI will be integrated, but rather, how it can be done thoughtfully? How can designers utilize these tools to enhance rather than inhibit the creative process? By systematically testing AI tools across the workflow, this thesis aims to provide a validated, practical framework that empowers designers to harness this powerful technology. It aims to explore both the technical limitations as well as the creative opportunities, to understand how, not if, AI can be integrated into the designers' workflow.

## 5.3 EXPERIMENTATION FRAMEWORK AND EVALUATION CRITERIA

The theoretical framework and literature review in the previous chapters established a strong potential for AI integration within the fashion design workflow. However, in order to truly move from theory to practice, rigorous and systematic experimentation were essential. This section details the experimentation performed to evaluate the real-world effectiveness of the various AI tools discussed in Chapter 4 across the fashion design workflow. This research is grounded in a practice-based, exploratory methodology. Rather than approaching the subject from a purely theoretical perspective, it was essential to engage directly with the tools themselves. In doing so, the experimentation tests Gen AI's capabilities against the real tasks that define a designer's process. This approach reflects the broader argument of the thesis: that the integration of AI into fashion design cannot be fully understood through literature alone, but must be interrogated through direct, documented practice. This study is

therefore best understood as exploratory and directional in nature, rather than as a controlled scientific study seeking statistically generalizable conclusions. Its aim is to develop a grounded, practical framework for understanding where and how AI may be integrated into the fashion design workflow, rather than to produce results that can be universally applied across all designers, brands, or creative contexts. As such, all experimentation was conducted by a single researcher across a defined period of 6 months, with prompts, inputs, and outputs documented consistently throughout. Key evaluation criteria were established prior to the beginning of the trials, ensuring that the framework was not shaped by the results themselves, but rather applied to said results with consistency.

These experiments methodically tested various Gen AI tools' ability to assist a designer in creating a collection across the design workflow. This was critical in order to test the integration of AI tools in each step of the design process. The experiments were designed to be granular, testing specific tasks within each phase of the design process, from the abstract conceptualization of a collection to the precise technical specifications required for pattern making and sampling. It is important to note that all experimenta-

tion was conducted within the context of a single collection, built around one creative direction, "Invisible Labor," and developed by one researcher. This was a deliberate methodological choice, as it allowed for a depth of engagement with each of the phases the design process that a broader study would not have permitted. It was intended to replicate potential interactions between a designer and Gen AI throughout the design process, to provide insight for how and when Gen AI may prove most and least useful. However, it does mean that the findings are necessarily situated within a specific aesthetic and garment territory, and results may differ across other creative directions, garment categories, or design contexts. The research is intended to serve as a directional framework, one that maps the current landscape of AI integration in fashion design and identifies where the technology shows the most promise, rather than as a definitive or universally applicable benchmark to all designers or all design processes. Several key criteria were considered in selecting AI tools for experimentation on the integration of artificial intelligence into the fashion design workflow. The criteria are as follows: accessibility and cost, technical abilities, and inclusion of both design-specific and non-design

specific platforms. First and foremost, accessibility and cost were considered. Platforms needed to be readily available to an individual in order to be considered for experimentation. As some platforms require "demos" or professional business registrations, these softwares were automatically disqualified. Cost was also an important consideration for experimentation, for accessibility reasons, as the price may vary from platform to platform, with some being entirely free. The pricing plans vary between different softwares, with some being a monthly subscription system and others being on a credit system. No tool was selected that cost more than \$100 USD a month, or for a "basic" set of credits when the credits system was used. Another important criteria was to select both design-specific and non-design specific AI tools, to demonstrate their differences and capabilities. Technical abilities are another key criteria, as the accepted inputs and outputs of a software may vastly differentiate a platform's abilities. Softwares were selected, so that when used in the experimentation, a wide range of inputs and outputs were possible to test. An incomplete list of examples of these inputs and outputs include Text-to-Text, Text-to-Image, and Image-to-Image. This is necessary to fully explore AI's integration with the

breadth of the fashion design workflow. Some considerations were not included in the selection criteria, but are important to note. These include data and IP protection, technology utilized within the algorithm, technical support, and integration of file formats into the designer's workflow. Data and IP protection, which while not specifically relevant to this broader experimentation, would be critical for a designer working for a business. The technologies utilized within the algorithm are quite important, but as this data is not widely available for all softwares, the technology utilized in the models are noted when possible, but could not be used as an effective selection criteria. Technical support for the softwares vary, and while relevant to the individual user experience, they did not seem critical enough to include in the selection criteria. Finally, the integration of file formats into the design workflow is quite critical, but cannot be fully understood until the experimentation begins, and so it is noted in the experimentation chapter, rather than referenced as a selection criteria. After careful consideration of the key criteria, 6 softwares were selected for the experimentation. Each one fit within guidelines for selection, and was tested for its unique abilities and limitations. The

final set of softwares selected for experimentation are as follows: ChatGPT (and DALL-E), DeepSeek, The New Black, Vizcom, Midjourney, and Adobe Firefly. Together, these six tools span a range of intended uses, input and output formats, and underlying models, as detailed in the comparative overview presented in Chapter 4. This selection was deliberate in ensuring that the experimentation covered both general-purpose large language models and image generators, as well as platforms designed specifically for the fashion and design industries. In doing so, the trials were able to explore both the breadth and the depth of what is currently available to a designer working independently, within a realistic budget. Once again, it is important to note that this list of softwares was compiled by a single researcher in an exploratory study, however, this list is not comprehensive to all softwares available or viable for this type of experimentation, and as new tools begin to emerge in the Gen AI landscape, other tools may prove to fit more seamlessly into the designer's workflow. Once the softwares were selected, the experimentation process began. Each trial was structured around a clear hypothesis regarding the AI's expected output and was evaluated against a

consistent set of criteria. It is important to note that all trials were conducted by a single evaluator, the researcher, which introduces an inherent degree of subjectivity, particularly in categories such as creativity and aesthetic quality. This is an acknowledged characteristic of practice-based research, and was mitigated by applying the same defined criteria uniformly across every trial, regardless of the tool or phase being tested. The question of whether a second evaluator would have scored the trials similarly is a valid one, and inter-rater reliability would be a valuable dimension to explore in future research built upon this framework. For the purposes of this study, however, the consistency of the evaluative criteria and their pre-established definitions were the primary mechanisms for ensuring a structured assessment across all tools and phases of the experimentation. A five-point scale was selected for the scoring system as it offers adequate granularity to meaningfully distinguish between outputs of varying quality, while remaining practical and manageable for a single-evaluator framework. The evaluation criteria themselves were developed independently for this research, and were shaped by the specific demands of the fashion design workflow as outlined in

Chapter 3, as well as informed by existing literature on human-AI interaction and AI-assisted design. The work of Amershi et al. (2019) on guidelines for human-AI interaction, and Choi et al. (2023) on the development of AI-based automated fashion design systems, provided a useful conceptual grounding for thinking about how AI outputs should be assessed in a design context. Particularly within the degree of human involvement required, as well as the system's ability to respond accurately to a user's creative intent. The five key criteria developed to assess the effectiveness of each trial were designed to reflect both the practical and the creative dimensions of fashion design work. They ensure that the evaluation framework was sensitive to the full range of tasks being tested, rather than focusing on either technical output or aesthetic result alone. The evaluation criteria are designed to understand the prospect of AI's integration into the fashion design workflow. Five metrics were developed and then scored and averaged as previously mentioned, to quantify these results both on a detailed level, as well as for a general consensus on effectiveness. The five metrics that each phase was evaluated against were: the level of required human

involvement, the clarity in achieving the intended goal, the creativity of the output, its aesthetic quality, and its ease of integration into a standard workflow.

The first criteria, the level of required human involvement, refers to the degree of intervention, correction, or iterative prompting necessary for the output to become usable within a design context. This metric considers whether the AI acts as a genuinely supportive co-creative partner or whether a substantial amount of manual refinement is required to align the output with professional standards. The higher the score in this phase, the less human intervention was needed to achieve a result that was deemed acceptable. The next criteria, clarity in achieving the intended goal, evaluates how effectively the generated output responds to the original design brief or inputted prompt. Here, the focus lies on the system's ability to interpret a creative direction accurately, as well as how it performs at translating abstract or conceptual inputs into coherent and relevant results. The higher the score is in this criteria, the better the result was deemed to be. The creativity of the output examines the originality, and conceptual strength of the generation. Particularly in relation to innovation within the silhouette, material-

ity, detailing, or thematic development of the result. Rather than simply producing aesthetically pleasing outputs, this measure interrogates whether the AI is contributing novel ideas that extend beyond predictable or derivative outcomes. The higher the score in creativity, the more novel or innovative the output was considered to be. Aesthetic quality considers the visual refinement of the output. It takes into account key design principles, such as composition, proportion, color harmony, texture, and overall coherence, assessing whether the result meets the visual standards expected within the fashion practice. The higher the aesthetic score is, the better the output seemed to fit within these concepts. Finally, ease of integration into a standard workflow reflects a more practical or technical aspect of integration. It considers how seamlessly the generated outputs can be incorporated into the existing design pipelines. How may the results be integrated into the design process and technical softwares for mood boarding, concept development, technical specification, or presentation? The higher the score in this section, the more easily the output is deemed to fit within the traditional fashion design structure, specifically in relation to formatting, file type, and contents.

Together, these criteria provide a structured framework for evaluating Generative AI outputs. They work to assess the software's ability to be a functional and creative tool within the fashion design process.

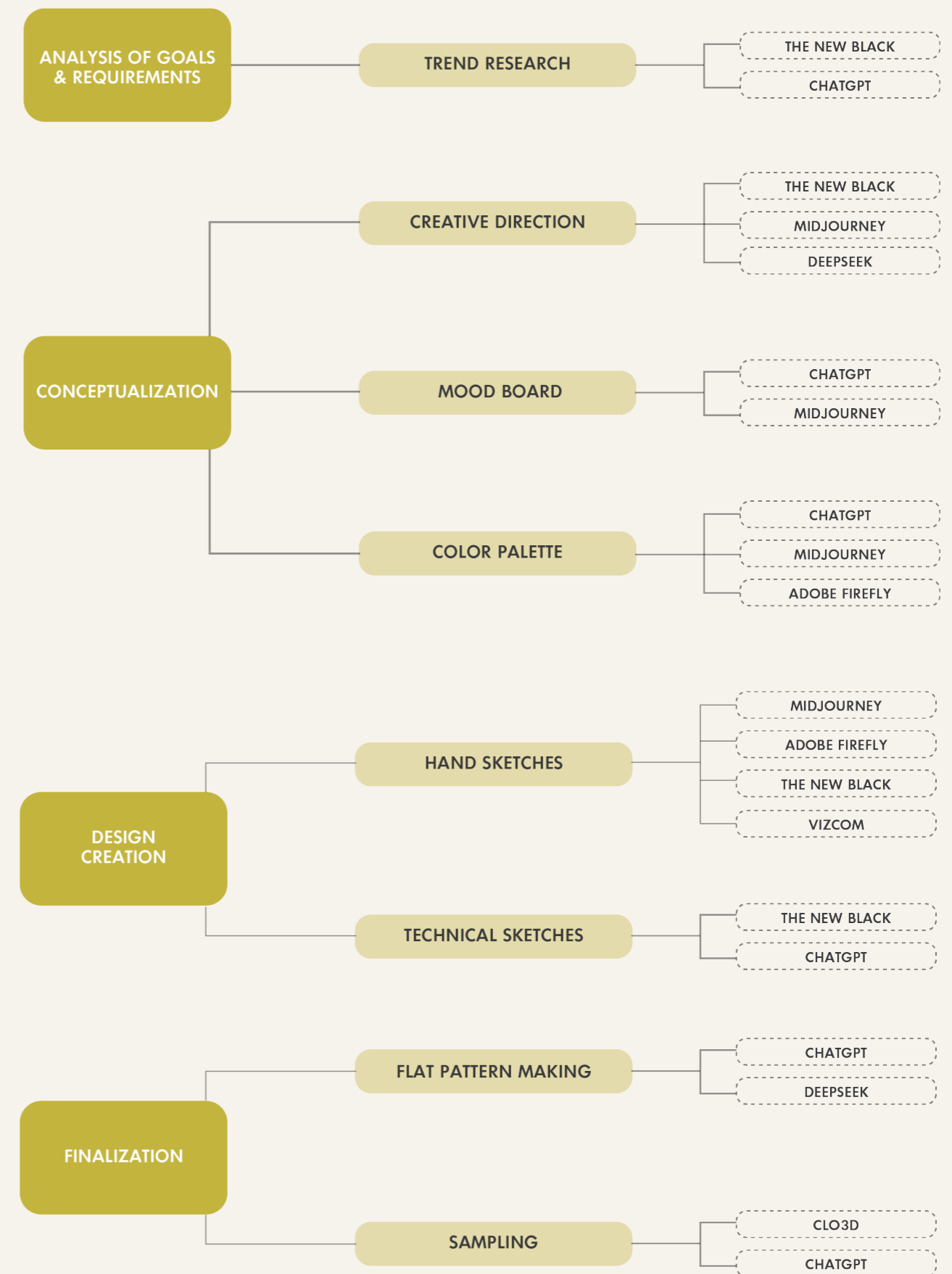
The evaluation was done by rating each of the trials on the criteria, from 1-5. Here, 1 represents the least helpful, or worst result, and 5 represents the most helpful, or best result. A high score does not necessarily mean a perfect, final output; it indicates that the AI-generated result is a high-quality starting point that may help to significantly accelerate a designer's process. The ratings of the criteria were then averaged to find the "AI Usefulness Score". If a specific criteria was not relevant to the specific phase, it was given a score of 0 in this category and the total was then divided by the number of criteria that was scored to create an accurate final evaluation. The results, documented in the following figures, provide a map of the current landscape of AI-assisted design, revealing both its transformative potential as well as its significant limitations.

An additional, critical, layer of technical validation was introduced in Phase 5 of the experimentation through the use of CLO3D, a professional virtual prototyping

software widely used within the fashion industry for digital sampling and garment simulation. CLO3D was selected as a validation instrument for a specific and deliberate reason: it provided an objective, physics-based environment in which to test the AI-generated pattern instructions produced in Phase 4. Where the scoring criteria used throughout the earlier phases necessarily involved a degree of subjective judgment, CLO3D offered something more concrete to the experimentation. It enabled the construction and testing of a digital garment from AI-generated measurements to observe whether the pattern was feasible, fit a body correctly, and reflected the intended design. However, it is important to acknowledge what CLO3D can and cannot confirm in this context. It is able to reveal structural issues in fit, proportion, and construction that would not be immediately visible on paper, and in doing so it provides a meaningful cross-check on the accuracy of AI-generated pattern data. It cannot, however, replicate the full complexity of physical sampling, where key factors such as fabric drape, weight, and hand feel play a critical role. The transition from a validated digital prototype to a finished physical garment therefore remains a step that falls outside

the scope of this study, and represents a clear direction for future research. It is also worth acknowledging the broader boundaries of this research. The tools selected and tested here reflect the landscape of Gen AI as it existed during the period of this experimentation. Given the rapid pace at which these platforms are developed and updated, results may vary as models are refined or replaced. Furthermore, because the research was conducted by a single evaluator working within one defined creative context, it is not the intention of this study to make universal claims about the capabilities or limitations of any individual tool. Rather, the aim is to document a structured, transparent process of engagement with these technologies, and to offer a practical framework that other designers and researchers may build upon, adapt, and interrogate in their own contexts. In this way, the research positions itself not as the final word on AI's role in fashion design, but as a necessary and timely first step toward a more rigorous and evidence-based understanding of what these tools can offer the designer today. In the following chart, you can clearly see what tools were used in each phase of the design process, for clarity and transparency. Not all tools were utilized in

all phases of the process, due to numerous factors, such as possible inputs and outputs and technical constraints, as well as time constraints. In the discussion, the most successful tool for each phase of the experimentation is documented, according to the rankings of experimentation conducted. The following chapters present the findings of these trials, structured according to the key phases of the design process outlined previously. For each phase of the experimentation, a table containing the previously mentioned key criteria will be used to help support the evaluation of the various tools. It remains consistent across the various phases as a way to benchmark the usefulness of the tools. This structured approach allows for a clear understanding of which tasks are most responsive to AI augmentation and where the technology may currently fall short, providing actionable insights for designers seeking to integrate these tools into their practice.



**Figure 14**  
Tools tested by design phase

## 5.4 PHASE 1: ANALYSIS OF GOALS AND REQUIREMENTS

The initial phase of any fashion collection begins with deep trend research, a process that involves research from every corner of the fashion industry; deep dives into runway shows, color forecasting, analyzing trend cycles, and understanding consumer behavior and purchasing patterns. Synthesizing this vast amount of visual and textual data

means hours upon hours of research and then analysis to finally create a coherent forecast. Some designers or brands will look to trend research companies or industry voices for this information, piecing together what makes sense for their individual consumer. Most typically, this is done both visually and textually to help fully explain the trend forecast. This phase of testing was done to understand AI's ability to act as a research assistant to the designer. In this phase, ChatGPT and the New Black were tested. These trials explored AI's ability to gather and present this information succinctly and efficiently.

TRIAL #	AI TOOL	INPUTS + OUTPUTS	REQUIRED HUMAN INVOLVEMENT	DISPLAYS INTENDED GOAL	REACHES AESTHETIC GOALS	CREATIVITY	INTEGRATION INTO WORKFLOW	AI USEFULNESS
1.1	ChatGPT	Text-to-Text	3	3	1	3	3	2.6
1.2	ChatGPT	Text-to-Text and Text-to-Image	2	5	5	3	5	4
1.3	The New Black	Text-to-Text	3	2	1	5	4	3

**Figure 15**  
Phase 1: Stage 1: Trend Research Summarized Results

In this phase,

### 1.1 TREND RESEARCH (TRIALS 1.1-1.3):

#### Trial 1.1 (ChatGPT: Text-to-Text):

The initial hypothesis was that ChatGPT could generate a well-explored list of trends for a designer to consider for the Fall/Winter 2026 season. The input was a text prompt requesting 20 top trends, including themes, colors, and fabrics. The output was a list of trends with descriptive text. However, the result was problematic for a visual field such as fashion; the descriptions were vague and entirely lacked any sort of visual cues. Furthermore, some of the source links provided were to trend reports for Resort collections, which are not seasonally relevant to Fall/Winter, undermining the accuracy of the research. This trial scored poorly on aesthetic goals (1/5) and overall usefulness (2.6/5), leading to the new hypothesis that ChatGPT is better suited as a tool for initial exploration and brainstorming than for delivering a final, authoritative trend report.

**Trial 1.2 (ChatGPT: Text-to-Image and Text):** To address the critical lack of visuals within the first trial, the hypothesis was refined. It was proposed that by prompting ChatGPT to act as a designer and provide both visual and text-driven research, it would generate a more useful output. The experiment required multiple prompts due to the platform's limit of four images per generation. The process encountered various technical issues, with some images failing to load, and the software occasionally pulled visuals from the wrong season as it had in the first trial as well. While the final output included 20 text descriptions and 20 supporting visuals, the inconsistency and the high degree of human effort required to manage the prompts and vet the images (score 2/5 for human involvement) were significant drawbacks. Despite this, the ability to generate visual references scored highly (5/5), confirming that it was possible to generate images for the trend research phase in ChatGPT, even if the process to achieve that requires a greater degree of human involvement.

#### Trial 1.3 (The New Black: Text-to-Text):

This trial tested a fashion-specific AI platform, The New Black, hypothesizing it would generate a more tailored and

well-explored list of trends. While the software did provide a well-curated list of trends for the correct season, it failed to generate images directly, instead providing links to external sources. This required the designer to leave the platform to seek out visuals, and several provided links, particularly to YouTube videos, were broken or unavailable. This placed the burden of visual research back onto the human designer. It scored highest in creativity (5/5) due to its industry-focused approach but lowest in displaying the intended visual goal (1/5), indicating that even specialized tools may not fully integrate the visual output required for a finished trend research report.

**Phase 1 Conclusion:**

The trend research phase demonstrated that AI tools can be powerful for accelerating the initial data-gathering and ideation stage of trend research. They can assist in offering rapid-fire concepts and, occasionally, visuals. However, they cannot be relied upon as a single source of truth or assistance. Their outputs still require significant human curation, fact-checking for seasonal accuracy, and supplementation from traditional sources. Additionally, trends must always be selected and curated by the designer to ensure that they stay in line with the

brand’s vision. For this reason, the trend research cannot be carried out entirely by the designer, however, it could be integrated as a tool for the designer to begin their trend research, and could help to reduce time spent doing a large-scale research. The tools’ primary value in the trend research phase lies in expanding the designer’s pool of research quickly, not in replacing deep, analytical, and verified research.

## 5.5 PHASE 2: CONCEPTUALIZATION

This phase involves defining the collection’s creative core, including its creative direction, visual mood, and color story. Here, the AI is tasked with assisting the designer through the creative journey of designing the collection. In the first step, the tools will be tested on their ability to create a coherent creative direction from loose ideas, themes, and trend research. Then, the tools will be used to assist in the development of a mood board based off of this creative direction, either through individual image generation to be reconstructed by the designer, or by developing the mood board in its entirety.

Finally, the tools will be asked to create a color palette for the collection. Through these experiments, the thesis will investigate AI’s ability to synthesize abstract themes into coherent creative assets, via text as well as visuals.

### 2.1 CREATIVE DIRECTION (TRIALS 2.1-2.3):

The creative direction brief is the foundation of the collection. Its purpose is to help the designer to build a narrative for a collection, detailing its inspiration, themes, and aesthetic goals. It guides

the entire design process, and as such, it is a critical starting point for designers. It also works as a tool to explain the collection’s direction to collaborators and peers, making its clarity and precision crucial to the collection’s success. This series of trials evaluated the capacity of ChatGPT, DeepSeek, and Midjourney to translate a set of core ideas and trend research into a coherent, and inspiring brief that will guide the entirety of the design process.

**Trial 2.1.1 (ChatGPT: Text-to-Text):**  
In this experiment, ChatGPT was tested on the hypothesis that it would be able to generate a coherent creative direction

TRIAL #	AI TOOL	INPUTS + OUTPUTS	REQUIRED HUMAN INVOLVEMENT	DISPLAYS INTENDED GOAL	REACHES AESTHETIC GOALS	CREATIVITY	INTEGRATION INTO WORKFLOW	AI USEFULNESS
2.1.1	ChatGPT	Text-to-Text	2	5	0	5	5	4.25
2.1.2	DeepSeek	Text-to-Text	4	5	0	4	5	4.5
2.1.3	ChatGPT + Midjourney	Image and Text-to-Text	3	5	0	5	5	4.5

**Figure 16**  
Phase 2: Stage 1: Creative Direction Summarized Results

from a simple prompt. The initial prompt, based on the themes of feminism and work wear, yielded two well-structured paragraphs. The designer selected the more compelling option, “Invisible Labor,” and through iterative refinement, specifically by asking the AI to rewrite the text through the lens of a critical fashion journalist, the output was transformed into a powerful, detailed, and nuanced brief. This trial demonstrated that ChatGPT’s value lies not in a single response, but in its capacity for collaborative iteration, allowing the designer to shape the tone, depth, and focus of the narrative until it aligns perfectly with their vision.

#### **Trial 2.1.2 (DeepSeek: Text-to-Text):**

This trial introduced a more nuanced and complex task: it prompted DeepSeek to research and incorporate specific Fall/Winter 25/26 trends into a creative direction based on the designer’s predefined themes. DeepSeek excelled at this synthesis, producing a concise and well-organized brief that seamlessly integrated trend forecasts like “Quiet Luxury” and “Utilitarian Dressing” into the “Invisible Labor” narrative. When prompted to specify exactly where these trends appeared in the text, the software provided a clear breakdown, demonstrating an

ability to not just generate content but to also analyze and explain its own compositional logic. This crucially indicates a strong potential for AI to assist in ensuring a creative direction that combines a designer or brand’s vision (through input themes) with trend-relevance.

#### **Trial 2.1.3 (ChatGPT + Midjourney: Image and Text-to-Text):**

In this trial, a new strategy was introduced through combining visual and textual inputs into the prompt. This trial tested the technology’s ability to analyze a visual mood board and summarize it into a critical creative direction. The experiment provided ChatGPT with a Midjourney-generated mood board image and asked for a paragraph summary. The result, “Reclaimed Realities,” was highly accurate, capturing the post-utilitarian and archival aesthetic of the imagery. It used specific terminology such as “cultural sedimentation,” “deconstruction,” and “elegant ruin,” and correctly identified key silhouettes and details. This trial proved that the tools are just as capable of developing a creative direction from visuals as it is from text descriptions, meaning the designer may have more room to experiment when integrating AI into this phase of the design workflow. It is an

interesting conclusion and a significant step towards a more integrated AI-assisted workflow where visuals and text may inform one another.

In summary, the creative direction trials were among the most successful of the entire experimentation process. The findings clearly show that the tools are exceptionally adept at narrative development. They can expand upon initial ideas, adapt to specific stylistic tones, incorporate external data such as trends, and even analyze and translate visuals into a coherent narrative. This positions AI as a powerful tool in the creative direction phase, providing practical assistance for overcoming creative block and rapidly developing a strong written foundation for a collection.

## **2.2 MOOD BOARD:**

The mood board is a tool that a designer creates in order to translate the written creative direction into a visual. It helps the designer to visualize their vision for the collection. In the following trials, a variety of AI tools were tested for their potential success in creating a mood board. For the mood boards to be considered



**Figure 17**

Trial 2.2.1 AI Generated Mood board  
(Image generated using ChatGPT by Alexandra Jones, 2025.)

TRIAL #	AI TOOL	INPUTS + OUTPUTS	REQUIRED HUMAN INVOLVEMENT	DISPLAYS INTENDED GOAL	REACHES AESTHETIC GOALS	CREATIVITY	INTEGRATION INTO WORKFLOW	AI USEFULNESS
2.2.1	ChatGPT	Text-to-Text and Image	3	5	3	2	3	3.2
2.2.2	Midjourney	Text-to-Image and Image-to-Image	1	4	5	4	5	3.8
2.2.3	Midjourney	Text-to-Image	3	5	5	5	5	4.6

**Figure 18**  
Phase 2: Stage 2: Mood Board  
Summarized Results

successful, they needed to be both aesthetically pleasing as well as matching the themes provided in the prompt.

**Trial 2.2.1 (ChatGPT: Text-to-Text and Image):**

In this trial, it was hypothesized that ChatGPT could help a designer to generate a relevant mood board from a text prompt. Initially, it had failed to produce any images. Instead, it gave only a text description, which highlighted a key limitation. Further prompts for image generation resulted in visuals that were simple and rudimentary, lacking the layered, editorial quality of a professional

fashion mood board. The mood boards were presented in frames rather than as an overlapping collage, and even after prompting the software to make them “more creative” and “editorial,” the results still felt uninspiring and flat. Another key finding from this trial is that the images were not nearly as photo realistic as some of the later trials. This trial solidified that ChatGPT is not, in its current state, a promising tool for mood board creation.

**Trial 2.2.2 (Midjourney: Text-to-Image and Image-to-Image):**

This trial focused on one of the key features of Midjourney; generating

high-quality individual images. The designer inputted both text prompts as well as images using the /blend feature to combine various inspiration images. In this trial, Midjourney was able to produce a range of powerful, photo realistic visuals that seemed to effectively capture the themes of the “Invisible Labor”. This includes key details for the collection such as intricate embroidery on utilitarian fabric. These images scored highly on aesthetic quality as well for their clarity and photo realistic qualities. However, the trial confirmed that these outputs are raw assets and the designer must then act as a curator, selecting and collaging these images into a final board using external software such as Adobe Illustrator. This trial showed that Midjourney can be a promising source of inspiration, however, it’s not yet a replacement for the designer’s curatorial eye.

**Trial 2.2.3 (Midjourney: Text-to-Image):**

This trial tested Midjourney’s ability to generate a mood board in its finality. It prompted the software to generate a complete, collaged mood board from the text description of the creative direction. During its many iterations, the results varied in style and composition. The iterations required human feedback and key-

word adjustment (e.g., adding “menswear meets womenswear, plaids”) to better align with the aesthetic goals. While the final generated boards were visually rich and inspirational, they were still not a fully finished product, with certain details or colors not fitting the desired aesthetic. The process required a constant “conversation” with the tool, which showed that generating a truly flushed out mood board in a single prompt remains difficult at best, however the ability to produce a compelling starting point proved to be possible.

The mood board generation trials revealed that AI’s role in this process is best acknowledged as that of an image generator. The algorithms, and specifically in these trials, Midjourney, do exceptionally well at producing high-quality images based on the user’s text prompts or visual inputs. The technology begins to fall short, however, when tasked with curating and collaging the images into a coherent mood board. The most effective workflow found in these trials uses image generation tools to generate a wide assortment of images, which the designer can then select, edit, and arrange to construct the final mood board. In this workflow, the designer can use the AI tools to create their own images, rather

than exclusively relying on pre-existing images for their mood boards. In this way, the tools are quite revolutionary, as previously all images included in a mood board had to be created before. While the designer could edit and change the images as desired, the need for the images to be pre-existing is potentially limiting to the creativity of a board. When a designer uses Gen AI tools to develop images for their mood board, it enables them to use entirely new images altogether. By leveraging both the AI's speed and ability to create novel visuals, as well as the human's creative curation, AI can be a promising assistant to the mood board making process.

### 2.3 COLOR PALETTE:

The color palette of the collection helps to bridge the creative vision for the collection with the mood board, to create a holistic starting point for designing the collection. These trials investigated the AI algorithm's ability to generate color palettes that were visually appealing, while also including accurate Pantone codes,



**Figure 19**  
Trial 2.2.3 AI Generated Mood board  
(Image generated using Midjourney by  
Alexandra Jones, 2025.)

TRIAL #	AI TOOL	INPUTS + OUTPUTS	REQUIRED HUMAN INVOLVEMENT	DISPLAYS INTENDED GOAL	REACHES AESTHETIC GOALS	CREATIVITY	INTEGRATION INTO WORKFLOW	AI USEFULNESS
2.3.1	ChatGPT	Text-to-Text	2	5	5	5	4	4.2
2.3.2	Midjourney	Text-to-Image	4	2	1	5	1	2.6
2.3.3	Adobe Firefly	Text-to-Image	4	2	2	4	1	2.6
2.3.4	Adobe Firefly	Image and Text-to-Image	3	5	5	5	2	4

**Figure 20**  
Phase 2: Stage 3: Color Palette  
Summarized Results



**Figure 21**  
 Trial 2.3.1 AI Generated Color Palette  
 (Pantone color codes generated using Pantone by Alexandra Jones, 2025.) (Pantone, 2025)

which are critical to the design and production process. It tested a range of tools, specifically ChatGPT, Midjourney, and Adobe Firefly, for both visual and textual responses.

#### **Trial 2.3.1 (ChatGPT: Text-To-Text):**

This trial was a promising example of AI tools' ability to develop a color palette. The user input a prompt to suggest three palettes based on the creative direction of the "Invisible Labor" collection. From this prompt, the AI produced 3 unique, descriptive color stories. Through a series of prompts and responses between the user and ChatGPT, the user was able to combine palettes, request a specific number of colors, and refine the tones and shades of the colors. Most crucially, when prompted to, ChatGPT was able to report the Pantone codes of the colors as well as provide links to the official swatches on the Pantone website. This key ability allows ChatGPT to output production-ready technical data, which has not been a capability in any of the previous trials within the experimentation. This is a critical, and promising example

of an AI tool being of assistance in one of the more technical aspects of the fashion design workflow. It enables the designer to save a significant amount of time that they would traditionally have had to spend on manual research and cross-referencing colors.

#### **Trial 2.3.2 (Midjourney: Text-to-Image):**

This trial tested the hypothesis that an image generator would be able to create a visual color palette that included Pantone swatches and color codes. The results were unsuccessful both visually and technically. Despite the user continuously inputting clear prompts, Midjourney was largely unable to generate simple swatches, instead opting to produce collages featuring garments, models, and objects. There were additionally no Pantone codes present in the outputs, which is a key feature that ChatGPT was able to provide. This indicated that image generators, and particularly Midjourney, while excellent for exploring color combinations or visualizations, are not able to generate the type of standardized format that is typically required for a technical color palette.

#### **Trials 2.3.3 and 2.3.4 (Adobe Firefly: Text-to-Image and Image and Text-to-Image):**

These trials worked with Adobe Firefly, and further confirmed the challenges for image-based Gen AI in developing color palettes. Initial attempts to generate an eight-color palette from the provided creative direction brief resulted in chaotic visual generations which included none of the requested color swatches. In these trials the Pantone color codes were not able to be generated. Through further iteration, however, the task was reframed, and the software showed some promise. By providing a reference image for composition and prompting the software for specific desired fabric swatches (e.g., "tan canvas, ivory lace, dark denim"), Adobe Firefly was able to successfully generate fabric inspiration boards where colors were able to be visualized in a material context. While this was not the original goal of the prompting, it was significant in that it could help to provide further inspirational imagery and visualization for a designer. This suggests that for creating inspirational material boards rather than technical color palettes, AI can be effective with a very precise, guided input. Through the exploration of using AI tools

to assist with the development of color palettes, there have been several conclusions drawn. Firstly is that the color palette trials highlight a significant divide in AI capabilities, based on the format and intended purpose of the algorithm. Text-based models like ChatGPT excelled at creating color palettes, and showed promising results for generating, refining, and specifying the palettes with accuracy. ChatGPT was even able to perform the more technical part of color palette selection, in sourcing and reporting the colors' Pantone color codes. This is critical for design development and production, meaning that this ability is significant in the fashion design workflow. Image-based models like Midjourney and Adobe Firefly, however, are ineffective at creating the standardized color swatches and Pantone codes, but can be leveraged to help designers visualize colors applied to textures and materials. The optimal approach for using AI in the color palette phase of designing is a hybrid one. Ideally, a designer could use a text-based model to define the technical, specific color palette and then use an image generator model to help visualize those colors in context. AI's role in conceptualization is multifaceted and powerful. It is a powerhouse



**Figure 22**  
Trial 2.3.2 AI Generated Color Palette  
(Image generated using Midjourney by  
Alexandra Jones, 2025.)



**Figure 23**  
Trial 2.3.3 AI Generated Color Palette  
(Image generated using Adobe Firefly by  
Alexandra Jones, 2025.)

for narrative development and a capable, even superior, assistant for color science when using LLMs. For visual components, it acts best as a generator of raw ingredients (individual images, fabric swatches) rather than a creator of finished products (curated mood boards, abstract palettes). The designer's curatorial and artistic eye remains essential for synthesizing these ingredients into a coherent and impactful whole.

## 5.6 PHASE 3: DESIGN CREATION

Phase 3, Design Creation, marks the critical transition from the conceptualization phase into a tangible design. It does so by testing AI's capacity to generate viable garment ideas and, most importantly, the technical drawings that are required for manufacturing. The experiments were divided into two key stages: preliminary design visualization and technical sketch generation.

The preliminary design phase investigates AI's role as an ideation engine, and tests whether or not the algorithms are capable of rapidly generating visual representations of garments from a user's textual or visual prompts. In this phase, 4 different Gen AI tools were

tested, including Midjourney, The New Black, Vizcom and Adobe Firefly. Experiments with Midjourney and Adobe Firefly confirmed their strength in this area, producing a wide array of design variations that provide valuable inspiration for silhouettes, styling, and details. However, a consistent and critical limitation emerged across all trials: a profound lack of technical realism. Generated garments often featured strange details such as odd pocket spacing, missing structural closures, morphing fabrics, and unrealistic anatomical features, underscoring that these outputs universally required further refinement through human sketching to ensure feasibility.

### 3.1 PRELIMINARY DESIGN CREATION:

**Trial 3.1.1 (Midjourney: Text-to-Image):** This trial hypothesized that a text prompt could generate a useful visual for brainstorming. While the output, an image of a model in a tan jumpsuit, was stylistically aligned with the "work wear" theme that had been described, it exhibited significant technical flaws, including irregular pocket sizing and a lack of visible closures. These issues would require human intervention to reconsider and

TRIAL #	AI TOOL	INPUTS + OUTPUTS	REQUIRED HUMAN INVOLVEMENT	DISPLAYS INTENDED GOAL	REACHES AESTHETIC GOALS	CREATIVITY	INTEGRATION INTO WORKFLOW	AI USEFULNESS
3.1.1	Midjourney	Text-to-Image	3	5	5	4	5	4.4
3.1.2	Midjourney	Image-to-Image	3	4	5	5	4	4.2
3.1.3	Midjourney	Image-to-Image	3	5	5	5	5	4.6
3.1.4	Adobe Firefly	Text-to-Image	4	1	1	2	1	1.8
3.1.5	Adobe Firefly	Text and Image-to-Image	3	3	2	5	5	3.6
3.1.6	Adobe Firefly	Text and Image-to-Image	3	4	4	4	5	4
3.1.7	The New Black	Text and Image-to-Image	3	5	5	5	5	4.6
3.1.8	Vizcom	Text and Image-to-Image	2	2	3	5	4	3.2
3.1.9	Vizcom	Text and Image-to-Image	2	5	3	4	4	3.6

**Figure 24**  
Phase 3: Stage 1: Preliminary Design Creation Summarized Results



**Figure 25**  
Trial 3.1.1 AI Generated Outfit on Model  
(Image generated using Midjourney by Alexandra Jones, 2025.)

perfect, bringing down the human involvement score. The result served as inspirational but necessitated human intervention to resolve design details, scoring a 4.4 for its photo realisticity, ability to follow the prompted theme, and strong ideation potential despite its technical shortcomings.

**Trial 3.1.2 (Midjourney: Image-to-Image):**

This trial tested the software’s ability

to blend three inspiration images. This technique gave promising results, with photo realistic images that were found to meet a high aesthetic level. The /blend technique was further explored in later experiments. However, the resulting image of a denim set with lace detailing was cropped in an odd way, which obscured the full outfit and making details like front closures indiscernible. This followed the pattern of the first trial, signaling a problem with Midjourney’s ability to reconstruct physically possible garments.



**Figure 26**  
Trial 3.1.2 AI Generated Outfit on Model  
(Image generated using Midjourney by  
Alexandra Jones, 2025.)

This trial highlighted that while AI can synthesize style elements, it often fails to produce a complete, technically coherent visual, earning a 4.2 for its creative fusion but lack of full visibility.

**Trial 3.1.3 (Midjourney: Image-to-Image via /blend):**

This trial with Midjourney further explored the image blending function. The generated look was once again creatively interesting but contained some nonsensical elements like mismatched earrings and a garment that appeared to morph between shorts and a skirt. This reinforced the previous hypothesis that AI-generated designs are best used as a starting point for inspiration, and not as final blueprints. However, this trial scored the highest in this sub-phase (4.6) for creativity, despite confirming the need for human interpretation.

**Trial 3.1.4 (Adobe Firefly: Text-to-Image):** This trial with Adobe Firefly aimed to generate an outfit from a written creative direction brief alone. The result was a failure; instead of garments, the software produced irrelevant images like landscapes and abstract scenes. This starkly demonstrated that without highly specific, composition-guided prompting, general-purpose text inputs are ineffective for fashion design, resulting in a low score of 1.8.

**Trials 3.1.5 and 3.1.6 (Adobe Firefly: Text and Image-to-Image)** In these trials, a different hypothesis was tested. The prompt introduced reference images for composition and style. This is a unique feature of the Adobe Firefly tool, to have specific requirements or labels placed on the inspiration images that are input. The utilization of this feature significantly improved the output's relevance, generating the intended imagery of models in outfits. However, the aesthetic results varied widely and required multiple prompt adjustments to approach the designer's vision, indicating that Firefly is highly dependent on precise visual references to be useful, the trials scored 3.6 and 4.0, respectively.

**Trial 3.1.7 (The New Black: Text and Image-to-Image):** In this trial, the New Black was tested for a slightly different capability than the previous trials, however while still within the realm of design creation. Instead of creating the garment or outfit from inspiration images, the designer hand-sketched the designs, then input them back into the Gen AI algorithm. This process is more human-intensive, as it requires the designer to hand sketch the design, which affects its score for human involvement. The hypothesis was that if a sketch is input by the designer, that they would then receive a render as the output, which could help in the decision making process of de-



**Figure 27**  
Trial 3.1.5 AI Generated Outfit on Model  
(Image generated using Adobe Firefly by  
Alexandra Jones, 2025.)



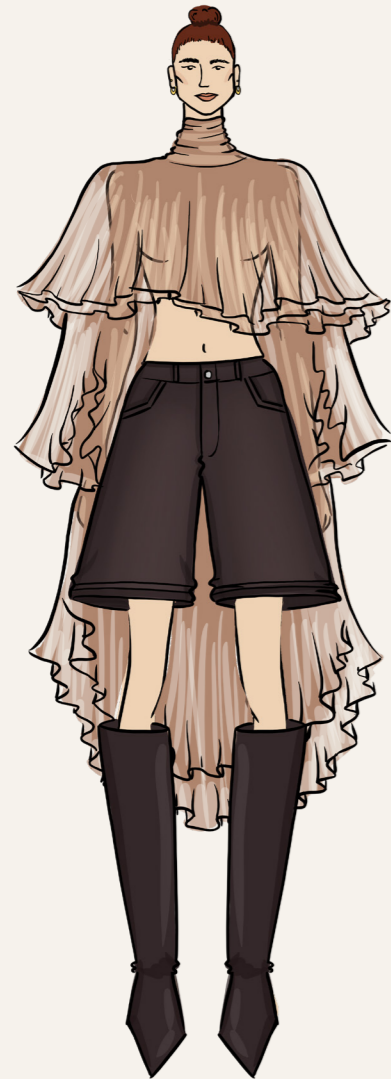
**Figure 28**  
Trial 3.1.6 AI Generated Outfit on Model  
(Image generated using Adobe Firefly by  
Alexandra Jones, 2025.)

sign creation. This approach proved to be highly effective for sketch-to-render transformation. Inputting a colored hand sketch and detailed description yielded photo realistic images that accurately visualized the garment on a model. Although multiple iterations (5-10 per image) were often needed to perfect the description, the final renders provided an invaluable tool for assessing proportion, drape, and styling before sampling, scoring a high 4.6.

#### **Trials 3.1.8 and 3.1.9 (Vizcom: Text and Image-to-Image):**

In these trials, Vizcom was tested in the same process that was used for trial 3.1.7. These trials differ, however, in that they tested the rendering capabilities from (in 3.1.8) a black and white sketch, and (in 3.1.9) a full-color sketch. The black and white sketch proved to be more valuable for design exploration, as it filled in different textures and colors for the designer to ideate with. The full-color sketch had more potential for rendering more finalized ideas and sketches. Vizcom fell short to the New Black in that it tended to follow the sketch lines too literally, interpreting outlines as unintended seams and struggling with realistic human proportions. Details such as facial

features were often distorted, and consistency in the results was difficult to maintain. The results were semi-photorealistic but less reliable than The New Black, which led to a scoring of 3.2 and 3.6. These trials suggest that Vizcom, while a potentially useful tool, requires extremely precise sketches to be effective. These experiments conclusively show that AI can be a powerful tool for front-end creative stimulation and visualization. It has potential for integration in the design creation phase both for initial exploration and ideation, as well as the more final stages of the design process, for converting sketches into photo realistic renderings. This can enable designers to quickly experiment with different inspirations and styles, while also enabling them to quickly make decisions surrounding the finalization of the garment. However, it remains an unreliable source for technically sound or production-ready designs on its own. The most effective workflow identified is a hybrid model: using AI for initial inspiration and high-quality visualization of human-designed sketches, while relying on the designer's expertise to ensure technical accuracy and feasibility.



**Figure 29**  
Hand Sketch done for AI input  
by Alexandra Jones



**Figure 30**  
Trial 3.1.7 AI Generated Outfit on Model  
(Image generated using The New Black by  
Alexandra Jones, 2025.)

### 3.2 TECHNICAL DRAWINGS:

This stage confronted a central challenge in AI integration: the generation of accurate, editable technical drawings (flats) necessary for pattern making and manufacturing. The efficacy of pattern making with the assistance of AI is still novel when compared to AI's integration into the other phases of design. For this reason, its testing was especially critical to this experimentation. Two different softwares were tested for their capabilities in generating Technical drawings: The New Black and ChatGPT. The hypothesis of this phase was that AI could interpret a design sketch and output a precise

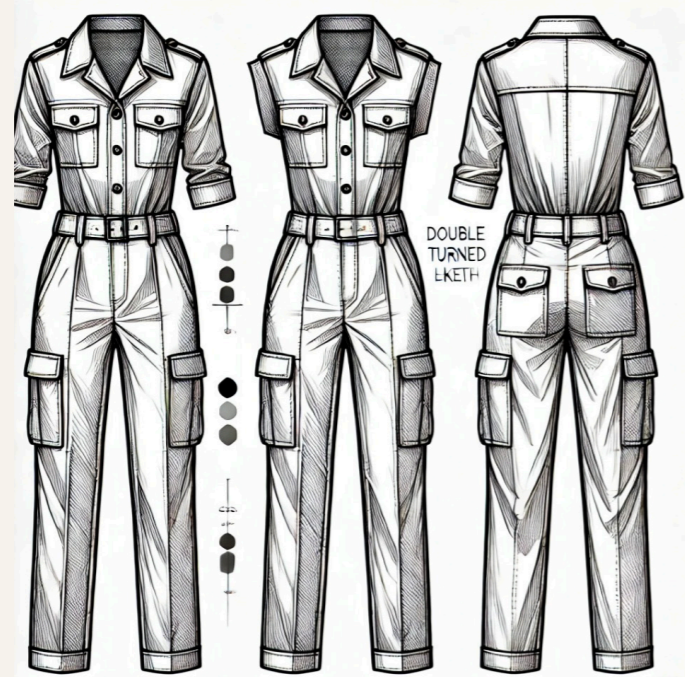
technical file, a complex task requiring an understanding of garment construction, proportion, and industry standards.

#### Trial 3.2.1 (The New Black: Image-to-Image):

The first trial, utilizing the New Black, directly translated a jumpsuit sketch into a technical drawing. The output was in fact a technical drawing, and it was structurally recognizable but contained significant inaccuracies in details, fit, and proportion. When creating a technical drawing, its precision is critical, as it is used to provide factories with instruction on how to manufacture the garment. Inaccuracies would require human involvement to per-

TRIAL #	AI TOOL	INPUTS + OUTPUTS	REQUIRED HUMAN INVOLVEMENT	DISPLAYS INTENDED GOAL	REACHES AESTHETIC GOALS	CREATIVITY	INTEGRATION INTO WORKFLOW	AI USEFULNESS
3.2.1	The New Black	Image-to-Image	2	4	5	3	4	3.75
3.2.2	ChatGPT + The New Black	Image-to-Text and Text-to-Image	1	3	3	0	2	2.25
3.2.3	ChatGPT	Text and Image-to-Image	4	5	5	0	1	3.75

**Figure 31**  
Phase 3: Stage 2: Technical Drawings  
Summarized Results



**Figure 32**  
 Trial 3.2.1 AI Generated Technical Drawing  
 (Image generated using ChatGPT by  
 Alexandra Jones, 2025.)

fect. While the file was downloadable in SVG format, its quality degraded severely upon export, rendering it practically useless for editing in Adobe Illustrator. The trial scored 3.75, indicating it could serve as a basic visual reference but not a production-ready asset.

### **Trial 3.2.2 (ChatGPT + The New Black: Image-to-Text and Text-To-Image)**

This trial introduced an intermediate step: ChatGPT was first used to describe a sketch, and that description was then input to The New Black. This method proved less effective than the previous trial, when a user input a sketch of the garment. The software produced a

technical drawing with major errors like missing sleeves and added belt buckles. With a score of 2.25, this workflow was deemed inefficient and error-prone.

### **Trial 3.2.3 (ChatGPT: Text and Image-to-Image):**

This trial, utilizing ChatGPT, yielded the most visually accurate technical drawing of a jumpsuit. Surprisingly, ChatGPT generated a highly precise PNG image that captured nearly every design detail correctly. However, this success was undermined by a critical workflow failure. The image was only available for export in an uneditable PNG format. When prompted to export an editable SVG, the

SVG contained only a poor-quality outline, with none of the precise details that made the first result so promising. This fundamental incompatibility with standard vector-based design software earned it a 3.75, highlighting a major barrier to practical integration within the fashion design workflow.

When considering the integration of Gen AI into the technical sketching stage of the design workflow, it currently falls short of expectations. The tools fail to deliver reliably accurate and editable technical flats. In this stage of the design process, precision is critical, and so although it can sometimes produce plausible visual references, the inability to export usable vector files means that any time saved in generation is lost in manual redrawing and correction within programs like Adobe Illustrator. Technical drawing remains a firmly human-led stage, with AI outputs serving as inspiration at best.

### **Phase 3: Stage 2: Technical Drawing Summarized Results:**

Gen AI may be usefully integrated into the design creation stage so long as it is utilized at specific times within the process. It is a powerful tool for front-end creative stimulation but remains unreliable for back-end technical specification. It is most useful in the early stages of designing, for ideation and brainstorming purposes, as well as at the final stages of design. In the final stages, designers can utilize AI tools to convert their sketches into photo-realistic renderings to consider factors such as the shape, color, and texture of the garment before proceeding with technical drawings. The tools can inspire a design but cannot yet be trusted to define it with the precision required for production. For technical drawings, Gen AI integration would not come with a strong recommendation. Its inability to output editable, accurate technical files is a significant barrier to its integration into the later, more technical stages of the design creation phase.

## 5.7 PHASE 4: PROTOTYPE DEVELOPMENT

### 4.1 FLAT PATTERN MAKING:

This phase tackled the most technically demanding question: can AI translate a design concept into a feasible construction guide for a physical garment? The experiments focused on the ability of large language models (LLMs) to gen-

erate not just visual patterns, but the textual instructions and measurements required for pattern drafting.

#### Trial 4.1.1 (ChatGPT: Text and Image-to-Image):

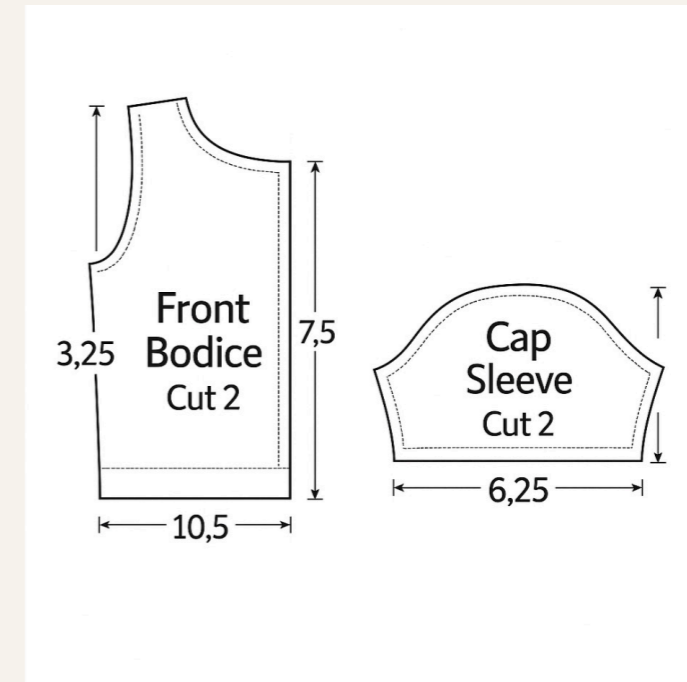
This trial, using ChatGPT, tested the hypothesis that AI could produce a downloadable, accurate PDF pattern for a jumpsuit. The result was a failure; after a long wait, the output was a simple text list of pattern pieces (e.g., “sleeve,” “pocket”) without any visual diagram or measurements, scoring a low 1.5.

#### Trial 4.1.2 (ChatGPT: Text-to-Image and Text):

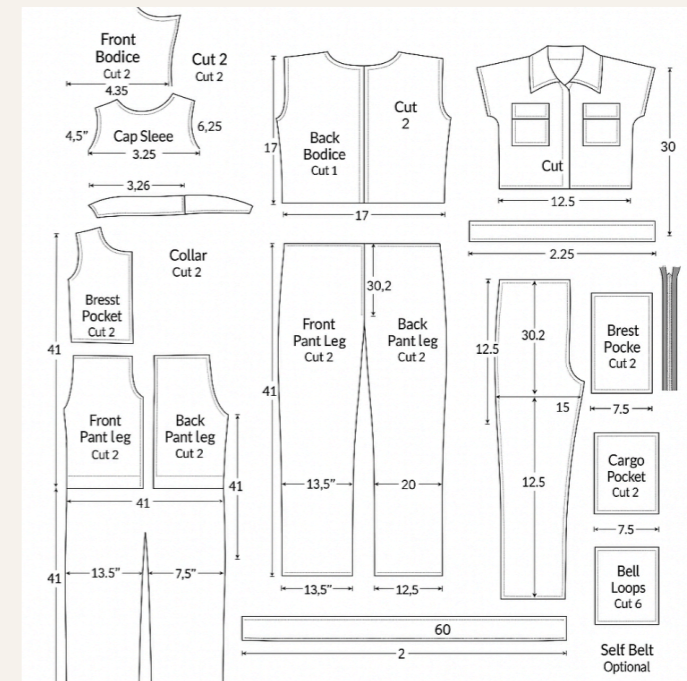
This trial focused on a basic T-shirt to test the capabilities of pattern making on

TRIAL #	AI TOOL	INPUTS + OUTPUTS	REQUIRED HUMAN INVOLVEMENT	DISPLAYS INTENDED GOAL	REACHES AESTHETIC GOALS	CREATIVITY	INTEGRATION INTO WORKFLOW	AI USEFULNESS
4.1.1	ChatGPT	Text and Image-to-Image	1	1	1	0	3	1.5
4.1.2	ChatGPT	Text-to-Image and Text	1	2	3	0	3	2.25
4.1.3	ChatGPT	Text and Image-to-Text and Image	1	2	3	0	1	2
4.1.4	ChatGPT	Text and Image-to-Text and Image	1	2	4	0	3	2.5

**Figure 33**  
Phase 4: Stage 1: Flat Pattern Making  
Summarized Results



**Figure 34**



**Figure 35**

Trial 4.1.3 AI Generated Flat Pattern  
(Image generated using ChatGPT by  
Alexandra Jones, 2025.)

a more simple garment. While the software again could not generate a coherent visual pattern diagram, it successfully provided a detailed textual description listing necessary pieces (ex: front, back, sleeve) and their measurements. This text-based output, scoring 2.25, revealed a new potential: AI as an instructional guide rather than a draftsman.

**Trials 4.1.3 and 4.1.4 (ChatGPT: Text and Image-to-Text and Image):**

These trials further explored ChatGPT's ability to generate patterns for a jumpsuit and a denim jacket. The generated pattern images were incoherent, out of scale, and missing pieces. However, the accompanying text descriptions were detailed, listing all components (e.g., "Front Bodice x2," "Belt Loops x6") and providing measurements. These trials, scoring 2.0 and 2.5, confirmed that AI's

competency lies in descriptive, not visual, pattern generation.

**Phase 4: Stage 1: Flat Pattern Making Summarized Results:**

This phase yielded the most promising yet pragmatic finding of the entire experimentation process. AI tools currently available are not capable of generating direct outputs (pattern images), however, they succeed at generating intelligent instructions. In this way, the software may act as a highly knowledgeable assistant to the pattern maker, providing a structured blueprint that the human expert can then refine, correct, and finalize. This collaborative process, where AI handles the initial, mundane task of measurement calculation and piece enumeration, has the potential to significantly streamline one of the most time-consuming and skilled tasks in the workflow.

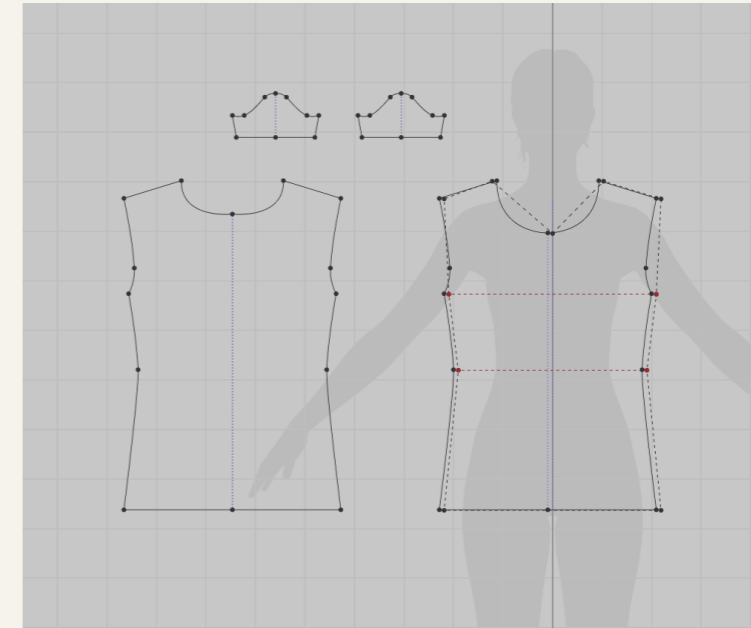


Figure 36



Figure 37

Trial 5.1.1 AI Generated Pattern and Clo3D Model  
(Pattern generated using ChatGPT by  
Alexandra Jones, 2025.)

## 5.8 PHASE 5: FINALIZATION

### 5.1: SAMPLING

The final phase served as a crucial technical validation, using CLO3D software to test the feasibility of AI-generated pattern instructions by constructing digital prototypes and analyzing their fit and design. The outputs needed to be fit the aesthetic vision for the garments, as well as being technically precise, combining Gen AI's most and least promising capabilities. These trials utilized the flat patterns generated in Phase 4, created in collaboration with ChatGPT. These experiments investigated the capabilities of Gen AI, in collaboration with virtual sampling tool CLO3D, at augmenting the notoriously complicated and difficult tasks of pattern-making and sampling.

**Trial 5.1.1 (CLO3D and ChatGPT):** This trial used the text-based instructions from Trial 4.1.2 to draft a pattern for a basic T-shirt. The virtual garment was successfully constructed and fit the

avatar model well, with only minor issues surrounding the fit in the bust and armpit areas, which would require further refinement. This was a significant success, scoring 3.75 and proving that AI-generated textual instructions can form a viable foundation for simple garments

**Trial 5.1.2 (CLO3D and ChatGPT):** This trial applied the same process as in the previous experiment, shifting only to include a more complex jumpsuit, rather than the more simple t-shirt. Its goal was to understand whether or not ChatGPT was able to accurately generate complicated patterns that could still be reproduced using CLO3D. The resulting digital sample revealed several fit and design discrepancies, such as an incorrect waist placement and pocket proportions. Scoring 2.75, this trial demonstrated that for complex garments, AI-provided measurements require substantial human refinement to match the intended design.

**Trial 5.1.3 (CLO3D and ChatGPT):** This trial tested the denim jacket instructions. Similar to the jumpsuit, the virtual prototype highlighted inaccuracies in collar construction and sleeve shape. However, the base pattern was a considerably more accurate starting point,



Figure 38

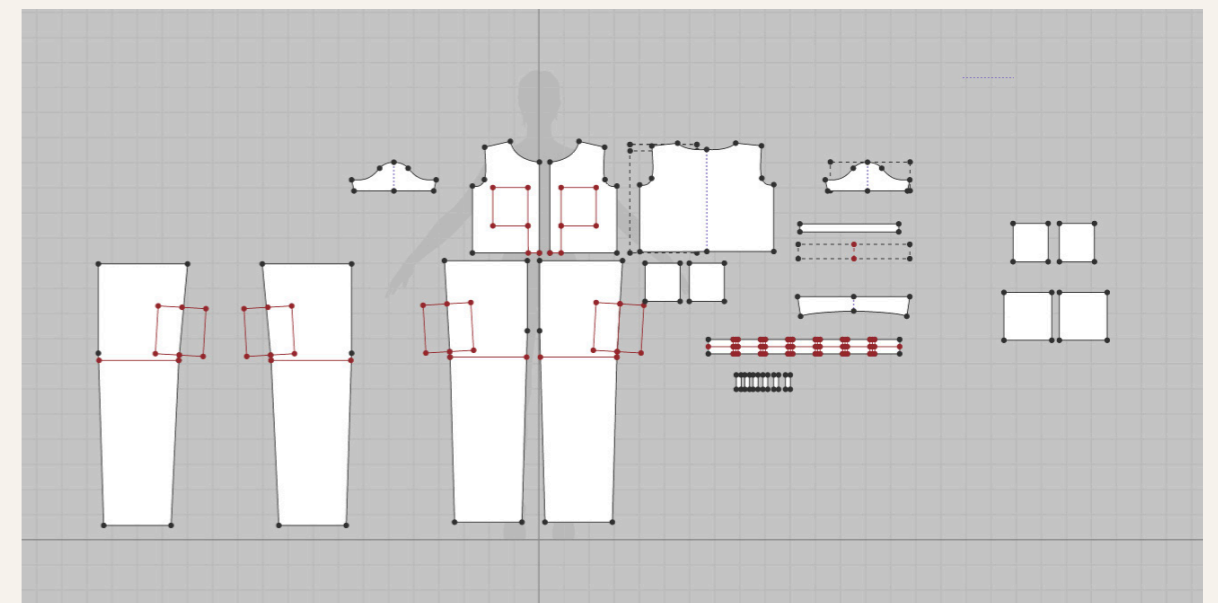


Figure 39

Trial 5.2.1 AI Generated Pattern and Clo3D Model  
(Pattern generated using ChatGPT by  
Alexandra Jones, 2025.)

and the trial scored a 3.5, reinforcing the collaborative model where AI provides a draft for human experts to correct and finalize.

The CLO3D validation was the most promising finding of the experimentation. It proved a vital distinction: while AI cannot draw a pattern, it can describe one with enough accuracy to serve as a foundational draft. This collaborative process, where AI handles the initial, mundane task of measurement calculation and piece enumeration, has the potential to significantly streamline one of the most time-consuming and skilled tasks in the workflow. While Gen AI cannot currently act as sole pattern maker, it can act as an assistant. The technology can augment the early stages of pattern making, allowing more time for the designer to make adjustments, and corrections as needed.

## 5.9 SYNTHESIS OF RESULTS

To determine which tools offered the most value across the fashion design process, it is important to consider not only where the tools succeeded but also where they fell short. In this experimentation, there were critical capabilities missing that would enable a truly fluid, human-centered co-creative workflow. Across the five phases tested, the most effective tools shifted considerably depending on the task at hand. In the Analysis of Goals and Requirements phase, no single tool stood out as a clear winner. ChatGPT functioned best as a starting point for brainstorming, capable of rapidly generating trend lists; however, it occasionally pulled references from the wrong season entirely, undermining the reliability of its research. The New Black, as a fashion-specific platform, offered more industry-relevant trend curation, but failed to integrate visuals directly into its outputs, instead redirecting designers to external sources, several of which were broken or unavailable. What is notably absent from the tools currently available is a platform capable of synthesizing

trend data and generating seasonally accurate, high-quality visual references simultaneously, within a single interface. Such a capability would significantly reduce the burden of manual curation that currently falls on the designer, and would represent a meaningful step toward a more seamless research workflow. In the Conceptualization phase, AI demonstrated its strongest performance across the entire experimentation. For creative direction development, all of the tools, Midjourney, ChatGPT and DeepSeek proved highly effective, though in distinct ways. ChatGPT excelled through its capacity for iterative, collaborative refinement, allowing the designer to shape the tone and depth of the narrative through a back-and-forth process of prompting and responding. DeepSeek, on the other hand, showed a stronger ability to incorporate external trend data directly into the creative direction, and notably, could explain its own compositional logic when prompted to do so. While the results for all three tools were of similar caliber, DeepSeek's ability to integrate trend data into its response gave a critical edge in comparison to the other tools tested. For mood board development, Midjourney was the strongest tool available, producing photo realistic

and aesthetically rich imagery through both text and image-to-image prompting. However, it was unable to independently curate or collage these images into a finished mood board, leaving that stage of the process entirely to the designer. For color palette development, ChatGPT led once again, and uniquely so, as it was the only tool capable of generating technically precise palettes complete with Pantone codes and links to official swatches, a capability that image-based tools like Midjourney and Adobe Firefly could not replicate. The most significant gap across this phase is the absence of a tool that connects image generation with layout and collaging capabilities within a single environment, meaning designers must currently exit the AI workflow entirely to assemble final assets in external software such as Adobe Illustrator. Bridging this gap would allow the conceptualization phase to feel far more cohesive and intuitive. In the Design Creation phase, the findings became more fragmented. For preliminary design visualization, Midjourney again produced the strongest and most photo realistic garment imagery, though it consistently struggled with technical accuracy, generating garments with unclear closures, inconsistent proportions, and

details that did not translate into feasible construction. The New Black differentiated itself as well, particularly in its ability to transform hand-drawn colored sketches into highly accurate photo realistic renderings, making it a valuable tool for assessing proportion, drape, and styling before moving into sampling. Adobe Firefly showed some promise but proved heavily dependent on precise reference image inputs, producing inconsistent results without them. Vizcom, while a potentially useful sketch rendering tool, tended to follow sketch lines too literally, interpreting outlines as unintended seams and struggling with realistic human proportions, making it less reliable overall than The New Black. For technical drawing generation, no tool was able to produce a production-ready, editable output. ChatGPT came closest in terms of visual accuracy, but could only export a static PNG file, and The New Black's SVG exports degraded severely upon download, rendering them incompatible with standard vector software. The most critical missing feature at this stage is a reliable, high-fidelity vector export that integrates directly with programs like Adobe Illustrator, as without this, even the most visually accurate technical drawing cannot enter the production pipeline.

In the Prototype Development and Evaluation phases, the role of AI shifted from visual generation toward textual instruction, and it was here that a quiet but significant capability emerged. ChatGPT proved the most capable tool, generating detailed and largely accurate lists of pattern pieces alongside their measurements, which, when carried into CLO3D, produced viable digital prototypes. This worked most successfully for simpler garments, such as the basic T-shirt trialed in Phase 5, while more complex pieces like jumpsuits and denim jackets required considerably more human correction to align with the intended design. DeepSeek underperformed in this phase, producing less precise instructions with notable errors, and was deemed unsuitable for this stage of the workflow. The most transformative missing capability across these phases would be a tool able to generate to-scale, editable visual pattern diagrams that integrate directly into pattern making software, which would close the gap between AI's descriptive competency and the level of technical precision that manufacturing genuinely demands. Looking across all five phases as a whole, the most significant gap in the current landscape of AI tools is the absence of an end-to-end platform capable of maintain-

ing contextual memory of the collection across the entire design process. A tool that could carry the creative direction, color palette, and design details from one phase into the next, without requiring the designer to re-input information at every stage, would fundamentally change the nature of human-AI collaboration in fashion design and bring it considerably closer to a seamless, intuitive co-creative workflow.

When considering the implementation of Gen AI into the fashion design workflow, the results of this experimentation are mixed. The value of the tools shifts dramatically depending on the prompt, the input data or images, the methodology, and the phase of the process. Gen AI demonstrates its greatest strength in the initial, conceptual stages of the design process, where the goal is to have a wide breadth of ideas and coherent narrative development. Tasks such as weaving trend research into a creative direction or generating a technically specified color palette with Pantone codes are where AI may act as a powerful accelerator, handling complex data synthesis and providing inspiration for the designer's creativity.

When the process moves into visualization, the creation of mood boards or de-

sign creation, the relationship between AI and the designer becomes more collaborative. Here, AI functions less as an automator and more as a generator. Tools like Midjourney can many high-quality images, but these are only raw materials. To be utilized in the design process, they require the designer's eye to select, arrange, and refine them. The current technology excels at producing inspiration, but it falls short when tasked with creating the final, polished composition. This phase underscores a key theme: AI may assist, but the human designer must remain firmly in charge.

The most critical results came from the technical side of the workflow: technical drawings and pattern making. The experiments consistently showed that AI was not able to reliably generate production-ready technical drawings or accurate, to-scale pattern diagrams. The software consistently struggled to produce accurate results, struggling most with proportions, and details such as pockets and closures. Most critically, it failed to integrate these technical drawings into industry-standard software like Adobe Illustrator in an editable format. Without this capability, even the most precise technical drawing is all but useless in the design process. However, an

## 6 DISCUSSION

interesting potential emerged when it came to pattern making. While AI was not able to draw the pattern, or even a diagram showing the pattern pieces (not to scale), it could describe it with surprising accuracy. The tools were able to provide detailed lists of pattern pieces and their precise measurements, specified to a model's body measurements. In this way, AI works as a knowledgeable assistant for the pattern maker, handling the initial, tedious setup and calculation, rather than replacing the craft altogether.

In conclusion, the most effective integration of AI is not as a replacement for the designer but as an augmentation of their capabilities. The technology shines in managing the preliminary tasks of information gathering and ideation, freeing the designer to focus on what truly requires human intelligence: high-level conceptualization, critical judgment, and the technical acumen needed to transform an idea into a wearable garment. The future of Gen AI in the fashion design workflow appears to lie in collaborative synergy, where the speed and scale of AI are harnessed under the guidance and control of the designer's vision.

### 6.1 REVISITING THE RESEARCH QUESTION

This thesis set out to explore the potential for AI's integration into the fashion design workflow, to investigate the tools' capabilities and limitations. The central research question of this paper was: to what extent can the current AI tools streamline mundane but critical tasks in the fashion design workflow without compromising creativity, technical accuracy, or production readiness, and where should human expertise remain decisively in the lead? In addition, it explored the collaborative relationship between AI tools and the human utilizing them, to outline best practices for creatives looking to use these tools. This question emerged from the recognition that designers spend much of their time navigating processes that are repetitive and technically demanding, which may lower their ability to spend time on more creative, engaging, and enjoyable tasks. With ever-quickenning trend cycles and timelines, the increasing pressure means that greater assistance is necessary

to provide support for designers. This thesis mapped out a traditional design workflow and then considered where AI could be incorporated to develop a high-tech alternative. These processes include analyzing trends and developing trend research, creating mood boards, developing sketches, producing technical drawings, and drafting patterns. The different stages all require varying outputs in terms of file format, aesthetic qualities, and technical precision. Experiments were then conducted, which have been recorded in detail in the spreadsheet, and were analyzed for success and potential integration into the design workflow. More technical steps such as pattern making were cross-checked using CLO3D to evaluate the precision of these tools in the specific design phases.

What this research has ultimately shown is that the use of AI in fashion design is promising in some ways, but limited in many others. From where AI technology currently stands, it is not possible to have it replace the work of a designer. What it offers in terms of vast, nearly immediate ideation and brainstorming power, it lacks in technical precision and attention to detail. In understanding this, it is clear that AI works most effectively as a collaborator, particularly in the early and explorato-

ry phases of design where the emphasis is on breadth, inspiration, and visualization. Its limitations, however, become more clear in the technical stages where precision, and fidelity are crucial. In the vital stages of design where ideas need to shift into physical, tangible designs, AI struggles the most. This suggests that AI is best understood as an assistant of brainstorming and creative exploration, where the designer must maintain a critical eye and control over the elements that move a design into production.

### 6.2 KEY FINDINGS

One of the most consistent observations across the experiments was that AI excels in the early stages of design, namely in ideation and visualization. ChatGPT, when prompted to consolidate trend and theme research, proved highly efficient at summarizing broad ideas into a coherent creative direction. This ability to rapidly synthesize references into a usable brief provides designers with an immediate starting point, even though the results may often need tailoring to a specific brand's identities or target au-

diences. Image-based generation tools such as Midjourney and Adobe Firefly showed promising results in generating preliminary looks. However, it's important to note that their usefulness was reliant on both the quality and specificity of the prompts a user provided. The most promising results were found when inputting visual references into the prompt, which reflects a need for specific aesthetic references while using the AI tools. The experiments also clearly showed that vague prompts tended to produce generic results, while detailed, precise prompts that combined visual references, style inspirations, and explicit garment details produced the best outputs that scored highly in both creativity and alignment with the intended design goals.

Vizcom and The New Black were both tested for their ability to translate hand-drawn sketches into photo realistic images or renderings of an outfit. The New Black was particularly effective in the sketch-to-render process, as it generated images that felt more photo realistic, and garments that followed the rules of physics more closely. When prompted with precise hand sketches and a detailed description of the garments, it generated photo realistic images that may aid in a designer's decision-making. These visu-

alizations allowed the designer to quickly assess an outfit or garment's proportion, fit, drape, and styling choices. In doing so, it offered a clear visualization for the designer to further refine. Although multiple iterations were necessary in this process, the speed of which a designer is able to achieve an accurate visualization of a garment (minutes) is incomparable to the amount of time that it would take to produce and photograph those same garments in real life (weeks to months). While this may not replace the sampling process entirely, it allows the sampling process to begin with a better understanding of the garment's visual goals. For this reason, the benefits in visual clarity and the aiding of decision-making vastly outweighed the time spent adjusting prompts. Vizcom, the other tool explored in this experimentation, was capable of generating photo-like images based off of sketches, however, it struggled to match the quality of output that The New Black produced. Its results were not necessarily photo realistic for a variety of reasons. Vizcom tended to follow the sketches too closely, mistaking sketched elements such as outlines for actual details. The software also fell short when it came to realistic human features, such as the face, hands, and bodily pro-

portions. For this reason, the New Black has a much stronger potential for integration into the fashion workflow at this stage in the design process.

While the early phases of the workflow, such as ideation and visualization benefited from AI, the technical phases of the workflow highlighted the limitations of current tools. Technical drawings generated through The New Black or ChatGPT were promising at first glance but ultimately fell short of industry standards. The New Black was able to create a technical drawing that was comparable to that of what is used in the fashion industry and produced by designers today, however, the drawings didn't necessarily match the intended design. Major discrepancies between the intended design and the technical drawing were unavoidable, such as incorrect fit, design details, and sleeve type. While ChatGPT did create some promising results when it came to technical drawings, files exported in vector formats were often degraded to the point of uselessness or incomplete. Because of this, its generated files can not be integrated into Adobe Illustrator, which is the cornerstone of technical documentation within the fashion design workflow. In many cases, garments were depicted plausibly, but small inconsisten-

cies such as misplaced sleeves, incorrect pocket shapes, or extraneous details meant that time saved in generation was often lost in re-drawing the technical drawing and in its correction. The experiments confirmed that AI outputs were better suited as visual references than as production-ready flats.

Flat pattern making presented similar challenges to that of technical drawings. ChatGPT was able to produce useful piece lists and ballpark measurements, and in some cases even supplied diagrams of the pattern pieces. However, these diagrams were frequently cropped so as not to see all pieces, incomplete, or dimensionally unreliable. In addition, these drawings were not to scale, as is necessary for accurate pattern making, and so essentially unusable other than to provide the most basic assistance into the overall shape of the pattern piece. For a designer with years of experience and knowledge, these results are useful, but still require a substantial amount of human intervention and time consuming editing in order for the final pattern to be developed. For a non-designer, these results would be almost entirely useless, as an accurate, to-scale pattern diagram is essential for those without a long history of experience within the fashion design

industry. In one instance, belt loop measurements were inaccurate and sleeve dimensions required doubling, while waist placement in a jumpsuit pattern failed to match the intended silhouette. The results suggest that AI can function as a valuable planning partner, offering designers a starting point and a checklist of necessary pieces, but it cannot be relied upon for the precise drafting required in production. CLO3D was essential in revealing these shortcomings. By simulating the patterns generated by AI, the software exposed flaws in fit and construction that would not be immediately visible on paper. For simpler garments, such as a basic T-shirt, the AI-generated dimensions came closer to producing usable results, though even here adjustments were required. For more complex garments, the discrepancies in the pattern were more noticeable and problematic, reinforcing the need for human oversight and correction. The experiments therefore point to a clear division of labor. AI tools are best deployed as accelerators in research, ideation, and visualization, where their capacity for breadth and speed brings meaningful benefits. In contrast, technical drawing and pattern drafting remain human-led, with AI outputs serving primarily

as references rather than final deliverables. CLO3D, positioned as a verification anchor, ensured that patterns behaved as intended and provided a reliable framework for assessing the feasibility of AI-assisted outputs.

### 6.3 IMPLICATIONS FOR THE DESIGNER'S WORKFLOW

Taken together, the results suggest a rebalanced workflow where AI is integrated strategically. At the beginning of the process, ChatGPT can be used to consolidate trends research and articulate thematic directions, freeing designers from time-intensive summarization tasks. Tools such as Firefly, Midjourney, and Vizcom can then generate broad ranges of visual material, for mood boarding and subsequent design stages, provided that prompts are structured with care and supported by composition or style references. At this stage, AI acts as a research assistant and visual amplifier, accelerating the translation of ideas into tangible imagery.

Once sketches are developed, tools such as The New Black can convert them into photo realistic renders that support decision-making around silhouette and styling. These renders, when accurate, save time by making proportional and aesthetic choices clear before more labor-intensive technical work begins. However, as the process moves into the realm of technical flats and patterns, AI's integration takes a backseat, as Illustrator and human expertise once again become central. AI-generated drawings provide inspiration and reference points, but they must be reconstructed manually to meet technical production standards. Similarly, AI-generated pattern plans may provide a useful starting checklist but require careful translation into actual blocks and dimensions, with CLO3D playing a crucial role in their validation and refinement. This workflow demonstrates that AI is best treated as a collaborator and assistant that helps to accelerate the front end of the process, while human expertise remains absolutely indispensable in the technical and production-oriented stages. The result is not an elimination of human work but a reallocation of time, with designers able to devote more attention to creative exploration and refinement rather than repetitive preparation.

### 6.4 CONTRIBUTIONS AND LIMITATIONS

The contributions of this thesis lie in its task-specific evaluation of AI's role in fashion design and its grounding of conclusions in systematic experimentation. By using a five-factor scoring framework of: human involvement, ability to display goals, ability to reach aesthetic goals, creativity, workflow integration, and then averaging these factors for the final score of AI usefulness, this research avoided oversimplifying the performance of these tools. Each stage of the workflow was evaluated according to its own success criteria, ensuring that results were measured against the practical needs of the design process rather than simply abstract ideals. The documentation of experiments in both the spreadsheet and slides offered a transparent record of inputs, outputs, and scores, while CLO3D simulations provided a crucial layer of technical validation. At the same time, the thesis faced certain limitations. AI tools evolve rapidly, and results captured in this research represent a moment in time rather than a definitive statement of future capability. The

PHASE	STEP	MOST SUITABLE TOOL	FEATURES FOR IMPROVEMENT
Goals + Requirements	Trend Research	ChatGPT	<ul style="list-style-type: none"> <li>Inconsistent in results</li> <li>Pulled trend from inaccurate seasons</li> </ul>
Conceptualization	Creative Direction	DeepSeek	Well suited for integration into the design process
	Moodboard	Midjourney	<ul style="list-style-type: none"> <li>Unable to create layered, editable files for further refinement</li> <li>Required many iterations with inconsistent visuals</li> </ul>
	Color Palette	ChatGPT	Unable to provide visual references for colors - may only provide color codes
Design Creation	Preliminary Design	Midjourney	<ul style="list-style-type: none"> <li>Construction of the garments generated are impossible</li> <li>Lack accuracy in technical details</li> </ul>
	Technical Drawings	ChatGPT	Unable to create vectorized drawings necessary for professional application
Finalization	Flat Pattern Making	ChatGPT	Unable to create visual diagram of a flat pattern - only able to produce measurements
	Sampling	ChatGPT + CLO3D	Errors in technical details and measurements on more complex garments

**Figure 40**

Tools most suitable for each phase of the Design Process and the features that may be improved for better integration into the designer's workflow

evaluation framework, though structured, still carries an element of subjectivity, especially in aesthetic judgments. The experiments focused primarily on specific garment types, such as a jumpsuit and a T-shirt, and results may differ with more complex designs. Finally, because this project remained within a digital environment, physical prototyping was outside its scope, leaving the transition from virtual to tangible garments an open question.

## 6.5 FUTURE DIRECTIONS

Looking ahead, several areas emerge as promising directions for further exploration. The development of optimized tool chains that automate the transition from AI-generated outputs into Illustrator or CLO3D could reduce the current bottleneck around file fidelity. Further work could also investigate AI's capacity to generate graded patterns across size ranges, an area largely untouched in this research but of significant importance for production. Another valuable direction would be integrating AI-assisted

workflows with physical prototyping tools, bridging CLO3D simulations with automated cutting or 3D printing systems. Finally, while this thesis concentrated on efficiency, future work must also address the broader ethical and authorship concerns raised by AI in creative industries, including dataset biases and questions of ownership over generated content. AI is constantly evolving, and as such, these, and many other advancements are sure to develop in the coming years. Many factors will influence the development of these technologies and limit or incentivize their progress. Regulation and legislation is beginning to pop up worldwide, and its rule will be sure to influence the progression of such technologies. Public opinion on the usage of AI in creative industries is another crucial factor in the adoption of these technologies, as businesses must consider both their customers' opinions on the usage of AI as well as the benefits the software may bring to them. Sustainability is another key factor, as the current electrical demand required for AI is unprecedented, and only expected to grow. While the exact future of AI is unknown, its impact is indisputable.

## 6.6 FINAL REFLECTIONS

In reflecting on the work presented in this thesis, it is my belief that AI is neither a threat to fashion design nor a miraculous solution. Rather, it is a set of tools whose effectiveness depends entirely on how they are integrated into the designer's workflow. When used strategically and ethically, AI accelerates routine tasks without displacing the essence of design. It reduces the time spent on compiling briefs, generates diverse visual references, and produces persuasive renders that may help to inform decision-making. These gains allow designers to shift their focus toward the conceptual and aesthetic work that defines their creative identity. At the same time, when used without attention to format, fidelity, and precision, AI can just as easily introduce inefficiencies. Outputs that cannot be edited, exported, or verified may save time in the short term but add to the workload later in the process. The experiments conducted in this research repeatedly demonstrated this tension: the same tool that offered inspiration in one context created obstacles in another. This reality rein-

forces the need for designers to maintain control and to use AI as an assistant rather than a replacement.

Ultimately, this thesis reaffirms the principle that fashion design is as much about decision-making as it is about creation. AI tools, when deployed with discernment, provide designers with more opportunities to explore, visualize, and refine. They do not diminish creativity but amplify it by redistributing time and energy toward the elements of design that matter most to designers. The true promise of AI in fashion is not automation but amplification, and its most effective role is to serve as a collaborator that empowers designers to push the boundaries of their work while safeguarding the craft and expertise that define the discipline.

## 7 BIBLIOGRAPHY:

1 Granary. (2025, February 7). As an independent designer, AI can be your friend. Substack.com; 1 Granary. <https://1granary.substack.com/p/as-an-independent-designer-ai-can>

Adobe Firefly overview. (2025). Adobe.com. <https://helpx.adobe.com/firefly/web/get-started/learn-the-basics/adobe-firefly-overview.html>

Amershi, S., Inkpen, K., Teevan, J., Kikin-Gil, R., Horvitz, E., Weld, D., Vorvoreanu, M., Fourney, A., Nushi, B., Collisson, P., Suh, J., Iqbal, S., & Bennett, P. N. (2019). Guidelines for Human-AI Interaction. Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems - CHI '19. <https://doi.org/10.1145/3290605.3300233>

AU, J. S., & AU, Y. H. (2018). Creation of Conceptual Fashion Design Process Model. *Journal of Fashion Technology & Textile Engineering*, 06(02). <https://doi.org/10.4172/2329-9568.1000171>

Baskin, B., Morris, M., & Takanashi, L. (2024, September 24). The Debrief | Why Does Menswear All Look the Same? *The Business of Fashion*. <https://www.businessoffashion.com/podcasts/retail/the-debrief-why-does-menswear-all-look-the-same/>

Bertola, P., Colombi, C., & Vacca, F. (2018, April 1). *FASHIONabilities. Planning and Managing Design Processes in Fashion*. ResearchGate. [https://www.researchgate.net/publication/328476398\\_FASHIONabilities\\_Planning\\_and\\_Managing\\_Design\\_Processes\\_in\\_Fashion](https://www.researchgate.net/publication/328476398_FASHIONabilities_Planning_and_Managing_Design_Processes_in_Fashion)

328476398\_FASHIONabilities\_Planning\_and\_Managing\_Design\_Processes\_in\_Fashion

Cardillo, A. (2024, June 17). 20 Most Popular AI Tools Ranked (July 2024). *Exploding Topics*. <https://explodingtopics.com/blog/most-popular-ai-tools>

ChatGPT Pricing. (2025). Chatgpt.com. <https://chatgpt.com/pricing>

Choi, W., Kim, H. Y., Lee, Y., Lee, S., Lee, H., & Park, S. (2023). Developing an AI-based automated fashion design system: reflecting the work process of fashion

designers. *Fashion and Textiles*, 10(1). <https://doi.org/10.1186/s40691-023-00360-w>

Christiano, P., Leike, J., Brown, T. B., Martic, M., Legg, S., & Amodei, D. (2017). Deep reinforcement learning from human preferences. *ArXiv.org*. <https://arxiv.org/abs/1706.03741>

Community Guidelines. (2025). Midjourney. <https://docs.midjourney.com/hc/en-us/articles/32013696484109-Community-Guidelines>

CryptoExplorer. (2024, January 15). Technical Overview of Midjourney: Unraveling the Digital Artisan. *Medium*. <https://medium.com/@aiartistwork28/technical-overview-of-midjourney-unraveling-the-digital-artisan-f3019674991f>

Dell'Acqua, F., McFowland, E., Mollick, E., Lifshitz-Assaf, H., Kellogg, K. C., Rajendran, S., Krayer, L. J., Candelon, F., & Lakhani, K. R. (2023). Navigating the Jagged Technological Frontier: Field Experimental Evidence of the Effects of AI on Knowledge Worker Productivity and Quality. *Social Science Research Network*, 24-013. <https://doi.org/10.2139/ssrn.4573321>

Dilmegani, C. (2025, August 20). Generative AI in Fashion: 5 Use Cases with Case Studies. *Research.aimultiple.com*. <https://research.aimultiple.com/generative-ai-fashion/>

Dove, G., Halskov, K., Forlizzi, J., & Zimmerman, J. (2017). UX Design Innovation: Challenges for Working with Machine Learning as a Design Material. <https://doi.org/10.1145/3025453.3025739>

Dufour, A. J. F. (2022). AI in the fashion industry : a new tool for designers. *Www.politesi.polimi.it*. <https://www.politesi.polimi.it/handle/10589/205060>

Elektra Kotsoni. (2024, October 24). Style vs craft: Turning AI designs into IRL clothes. *Vogue Business*. <https://www.voguebusiness.com/story/fashion/taste-vs-craft-turning-ai-designs-into-irl-clothes>

FAQs – AI FASHION WEEKI Worldwide AI Fashion Week made with Artificial Intelligence. (2023). *Fashionweek.ai*. <https://fashionweek.ai/faqs/>

Gewirtz, D. (2025, April 8). The top 20 AI tools of 2025 - and the #1 thing to remember when you use them. *ZDNET*. [https://www.zdnet.com/article/the-top-20-ai-tools-of-](https://www.zdnet.com/article/the-top-20-ai-tools-of-2025-and-the-1-thing-to-remember-when-you-use-them/)

[2025-and-the-1-thing-to-remember-when-you-use-them/](https://www.zdnet.com/article/the-top-20-ai-tools-of-2025-and-the-1-thing-to-remember-when-you-use-them/)

Harreis, H., Koullias, T., Roberts, R., & Te, K. (2023, March 8). Generative AI in Fashion . *McKinsey; McKinsey & Company*. <https://www.mckinsey.com/industries/retail/our-insights/generative-ai-unlocking-the-future-of-fashion>

Hochman, N., & Manovich, L. (2013). A View from Above: Exploratory Visualizations of MoMA Photography Collection [Online Image]. In *Cultural Analytics Lab*. <https://lab.culturalanalytics.info/2016/04/exploratory-visualizations-of-thomas.html>

Kim, S. J. (2024, March 27). IEEE Xplore Full-Text PDF: *ieeexplore.ieee.org*. <https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10479205>

Lev Manovich. (2018). *AI Aesthetics*. Strelka Press.

Lev Manovich. (2020). *Cultural analytics*. The Mit Press.

Li, L., & Moncler. (2024). Look from Moncler X Lulu Li's collaboration [Online Image]. In *Red Eye*. <https://red-eye.world/c/digital-dreams-and-physical-fashion-co-exist-with-moncler-and-lulu-li-s-new-era-of-design>

Mabille, A. (2026). AI generated runway image [Online image]. In *Fashion Network*. <https://www.fashionnetwork.com/news/Alexis-mabille-propels-haute-couture-into-the-age-of-ai,1802277.html>

McKinsey & Company, & BOF Team. (2023, December 18). The Year Ahead: How Gen AI Is Reshaping Fashion's Creativity. *The Business of Fashion*. <https://www.businessoffashion.com/articles/technology/the-state-of-fashion-2024-report-generative-ai-artificial-intelligence-technology-creativity/>

Noti-Victor, J. (2025, March 7). Regulating Hidden AI Authorship - *Virginia Law Review*. *Virginia Law Review* -. <https://virginialawreview.org/articles/regulating-hidden-ai-authorship/>

Palazzetti Romualdi, F., & Monterosso, G. (2024). Analysis of the role, performance, and contribution of Generative AI Models in the Fashion Design Process. [https://www.politesi.polimi.it/retrieve/013e6583-887a-42bb-8c58-82b0fd6e3609/2024\\_10\\_Monterosso\\_PalazzettiR\\_Executive%20Summary.pdf](https://www.politesi.polimi.it/retrieve/013e6583-887a-42bb-8c58-82b0fd6e3609/2024_10_Monterosso_PalazzettiR_Executive%20Summary.pdf)

Pazur, B. (2025, February 5). What Is Midjourney? Here's What You Need to Know About the AI Image Generator. CNET. <https://www.cnet.com/tech/services-and-software/what-is-midjourney-heres-what-you-need-to-know-about-the-ai-image-generator/#ftag=CADf328eec>

Poo, M. (2025). Reflections on DeepSeek's Breakthrough. National Science Review, 12(3). <https://doi.org/10.1093/nsr/nwaf044>

Rabimov, S. (2024, November 29). The AI Revolution In Fashion: How Genera Is Shaping The Digital Future Of Design. Forbes. <https://www.forbes.com/sites/stephan-rabimov/2024/11/29/the-ai-revolution-in-fashion-how-genera-is-shaping-the-digital-future-of-design/>

Retouch Fashion Image with AI. (2023). The New Black | AI Clothing Fashion Design Generator. <https://thenewblack.ai/ai-design-features/edit-image-with-ai>

Schulz, M. (2023, April 5). What to expect at the first AI Fashion Week. Vogue Business. <https://www.voguebusiness.com/technology/what-to-expect-at-the-first-ai-fashion-week>

SEASON 1 – Recap – AI FASHION WEEK | Worldwide AI Fashion Week made with Artificial Intelligence. (2021, April 20). Fashion Week AI. <https://fashionweek.ai/season-1/>

Sher, G., & Benchlouch, A. (2024, February 8). Artificial Fashion: AI Poses Risks, Rewards for Players in Apparel. The Fashion Law. <https://www.thefashionlaw.com/artificial-fashion-ai-poses-risks-rewards-for-players-in-the-apparel-space/>

Shneiderman, B. (2020). Human-Centered Artificial Intelligence: Reliable, Safe & Trustworthy. International Journal of Human-Computer Interaction, 36(6), 495–504. <https://doi.org/10.1080/10447318.2020.1741118>

Sohl-Dickstein, J., Weiss, E. A., Maheswaranathan, N., & Ganguli, S. (2015). Deep Unsupervised Learning using Nonequilibrium Thermodynamics. ArXiv:1503.03585 [Cond-Mat, Q-Bio, Stat]. <https://arxiv.org/abs/1503.03585>

Stanford University. (2023). Artificial Intelligence Index Report 2023 Introduction

to the AI Index Report 2023. [https://hai.stanford.edu/assets/files/hai\\_ai-index-report\\_2023.pdf](https://hai.stanford.edu/assets/files/hai_ai-index-report_2023.pdf)

Takyar, A. (2023, April 19). AI for fashion brands: Use cases, benefits and future trends in the fashion landscape. LeewayHertz - Software Development Company. <https://www.leewayhertz.com/ai-use-cases-in-fashion/>

The Frick Collection. (2025, July 18). The Algorithmic Gaze: What Does It Mean to See—and Be Seen—in the Age of AI? YouTube. <https://www.youtube.com/watch?v=Ni4rjfZZNE>

Vaswani, A., Shazeer, N., Parmar, N., Uszkoreit, J., Jones, L., Gomez, A. N., Kaiser, L., & Polosukhin, I. (2017, June 12). Attention Is All You Need. Cornell University. <https://arxiv.org/abs/1706.03762>

Vizcom. (2024, September 19). 10Web. <https://10web.io/ai-tools/vizcom/>

Wilson, H. J., & Daugherty, P. R. (2018). Collaborative Intelligence: Humans and AI Are Joining Forces. Harvard Business Review. <https://hbr.org/2018/07/collaborative-intelligence-humans-and-ai-are-joining-forces>

Zewe, A. (2025, January 17). Explained: Generative AI's environmental impact. MIT News; Massachusetts Institute of Technology. <https://news.mit.edu/2025/explained-generative-ai-environmental-impact-0117>

Zhang, R., McNeese, N. J., Freeman, G., & Musick, G. (2021). "An Ideal Human": Expectations of AI Teammates in Human-AI Teaming. Proceedings of the ACM on Human-Computer Interaction, 4(CSCW3), 1–25. <https://doi.org/10.1145/3432945>

Zhang, Y., & Liu, C. (2024). Unlocking the Potential of Artificial Intelligence in Fashion Design and E-Commerce Applications: The Case of Midjourney. Journal of Theoretical and Applied Electronic Commerce Research, 19(1), 654–670. <https://doi.org/10.3390/jtaer19010035>

Zwieglinska, Z. (2025, January 27). Designing fashion in the AI era. Glossy. <https://www.glossy.co/fashion/designing-fashion-in-the-ai-era/>

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