Digital design for circular practices

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DIGITALIZATION

In the textile and fashion industry

The value chain

transiti✱ns

Co-funded by
the European Union
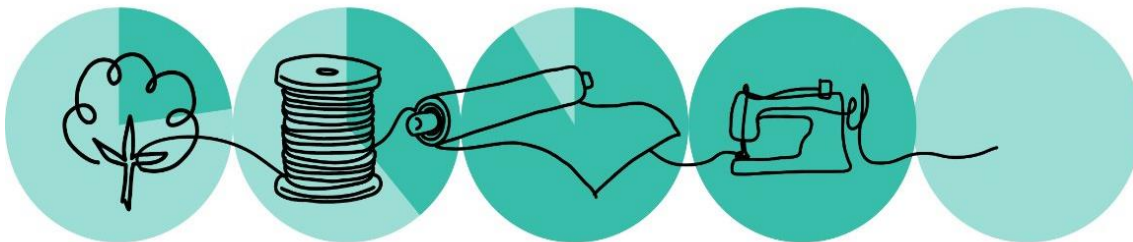
PRODUCTION ←———→ RETAILS

| MATERIAL PRODUCTION | DESIGN AND DEVELOPMENT | MANUFACTURING |

| DISTRIBUTION | SHOP | CUSTOMER EXPERIENCE |

PRODUCTION

MATERIAL	DESIGN AND DEVELOPMENT	MANUFACTURING

PRODUCTION – MATERIAL
PRODUCTION CHAIN

Image: Materra

MATERRA

Materra is a regenerative cotton + tech company helping fashion meet its ambitious sourcing and impact goals — with the data to prove it.
Their approach **integrates regenerative agriculture, water efficiency, and data-driven** farming to improve soil health, reduce carbon emissions, and ensure ethical production.

Benefit
TRANSPARENCY

PRODUCTION – MATERIAL
PRODUCTION CHAIN

DQA PROCES
(Data quality assessment)

Quality assurance (QA) is any systematic process of determining whether a product or service meets specified requirements. QA establishes and maintains set requirements for developing or manufacturing reliable products.
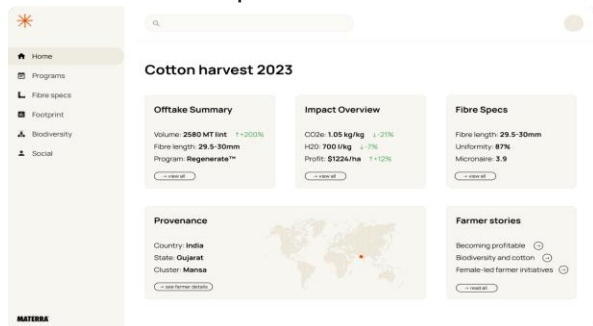

Image: Materra

ERP SYSTEM
(Enterprise resource planning)

ERP is the integrated management of main business processes, often in real time. ERP can use to collect, store, manage and interpret data from many business activities.

Image: Projectline

PRODUCTION – MATERIAL
PRODUCTION CHAIN

TEXTILEGENESIS

TextileGenesis provides a Software as a Service (SaaS) platform that enables fashion brands and sustainable textile manufacturers to ensure a reliable, secure and fully digital mapping of their textiles.

Benefit
TRACEABILITY

PRODUCTION – MATERIAL
PRODUCTION CHAIN

BLOCK-CHAIN

Blockchain technology is an advanced database mechanism that allows for the **transparent sharing** of information within a corporate network. A blockchain database **stores data** in blocks linked together in a chain.
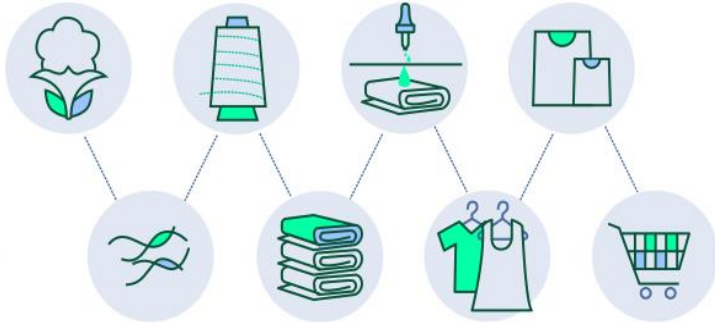

Image: Textilegenesis

FIBERCOIN™

Digital tokens provide a unique **"fingerprint".**

The **certification** system, which allows brands to access the full supply chain traceability and to view the results of forensic (physical) verification of fabric samples.
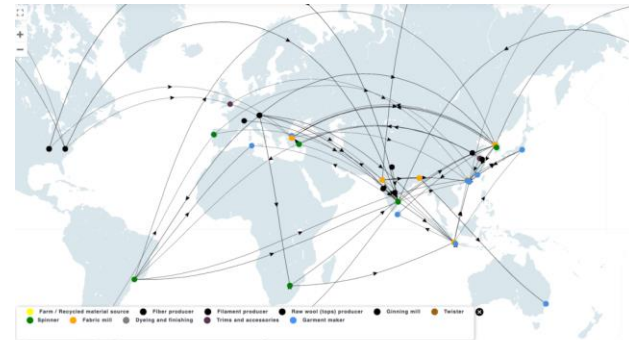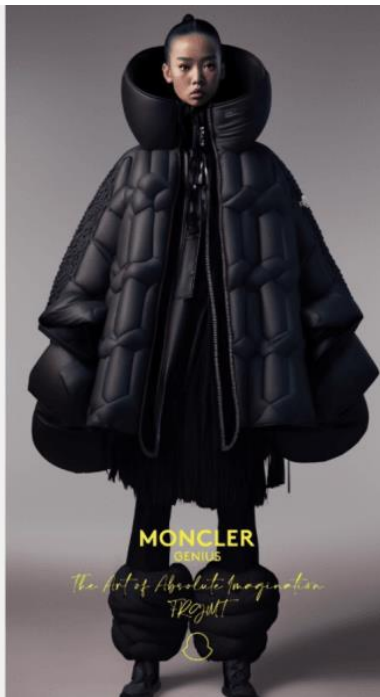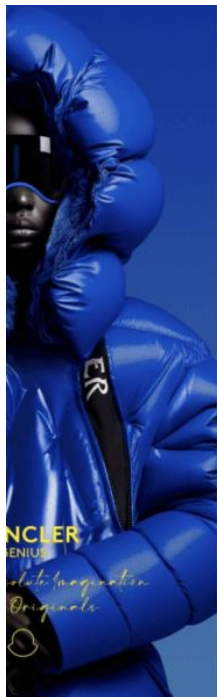

Image: Textilegenesis

PRODUCTION – DESIGN
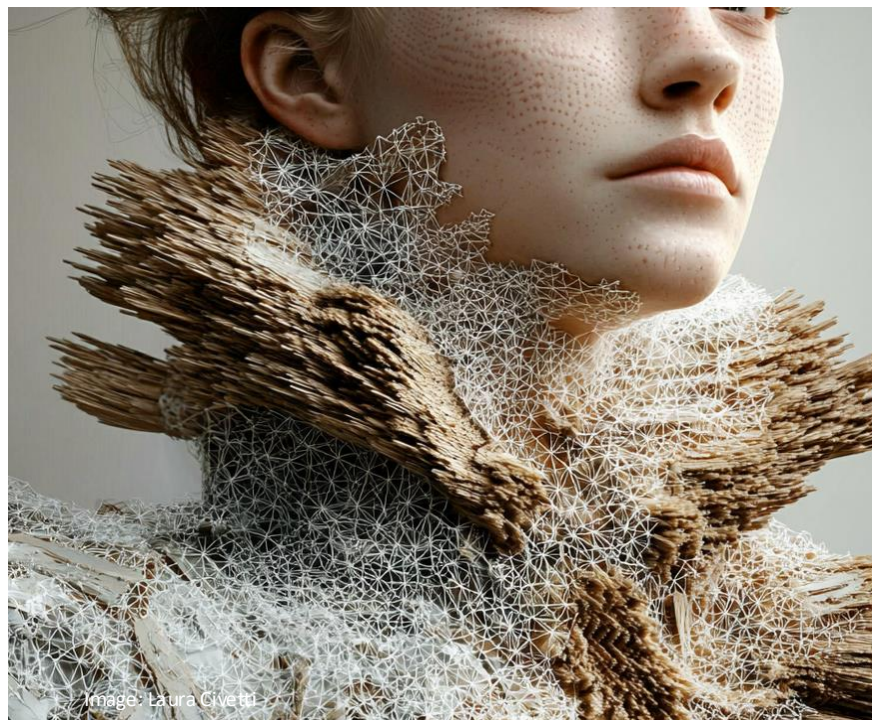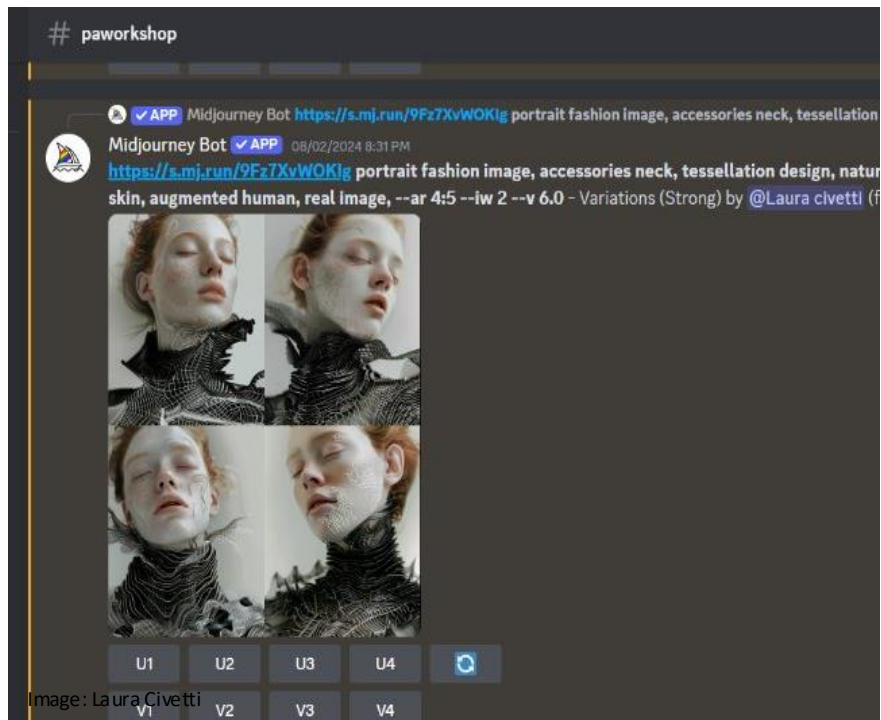# GENERATIVE AI

MAISON META

Adoption of AI as a design assistant.
AI-driven recommendation engines can help suggest personalized products based on individual customer preferences and browsing history

Benefit
CREATOR ASSISTANT

PRODUCTION – DESIGN
GENERATIVE AI

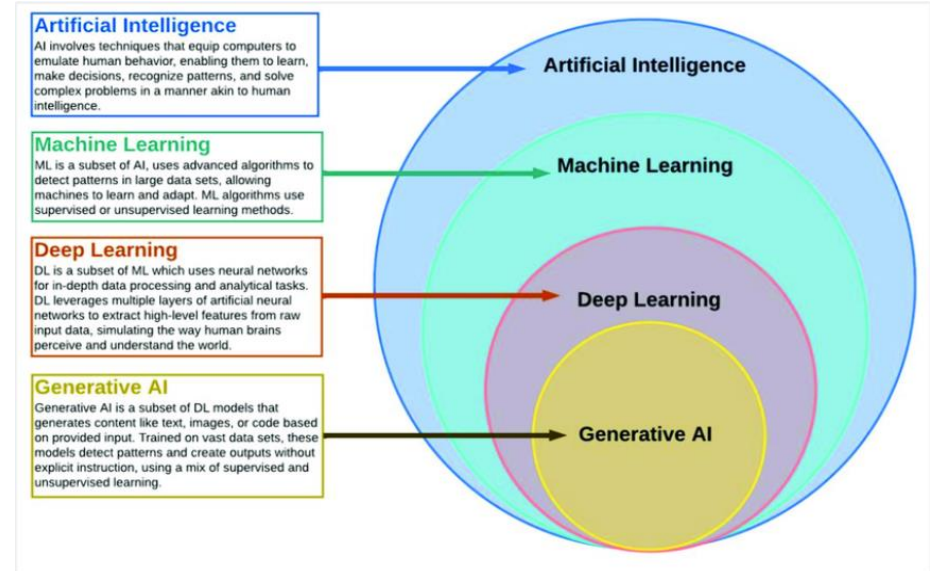Image: Laura Civetti

Image: Laura Civetti

PRODUCTION – DESIGN
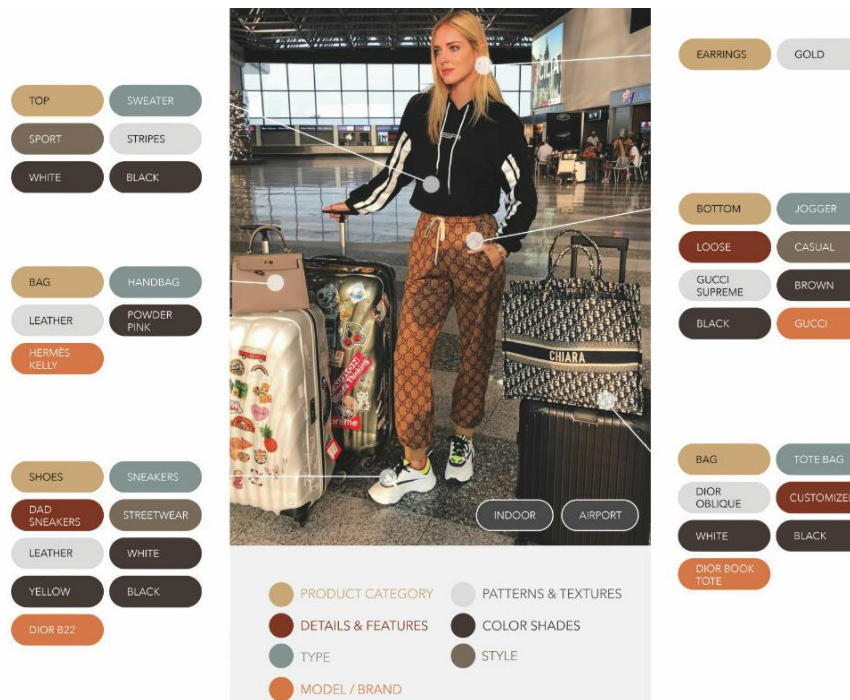# GENERATIVE AI

GENERATIVE AI

Generative AI is a subset of DL (Deep Learning) models that **generates new content** like text, images, videos, 3d models, or code based on provided input.

Trained on vast data sets, these models detect patterns and create output without explicit instruction, using a mix of supervised and unsupervised learning.

Artificial Intelligence
AI involves techniques that equip computers to emulate human behavior, enabling them to learn, make decisions, recognize patterns, and solve complex problems in a manner akin to human intelligence.

Machine Learning
ML is a subset of AI, uses advanced algorithms to detect patterns in large data sets, allowing machines to learn and adapt. ML algorithms use supervised or unsupervised learning methods.
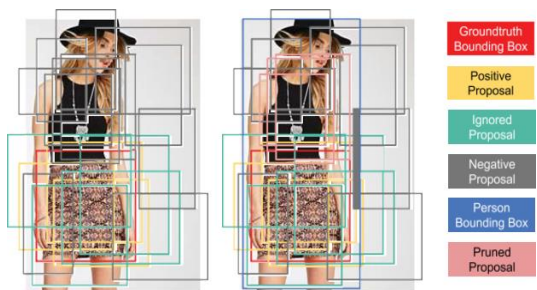
Deep Learning
DL is a subset of ML which uses neural networks for in-depth data processing and analytical tasks. DL leverages multiple layers of artificial neural networks to extract high-level features from raw input data, simulating the way human brains perceive and understand the world.

Generative AI
Generative AI is a subset of DL models that generates content like text, images, or code based on provided input. Trained on vast data sets, these models detect patterns and create outputs without explicit instruction, using a mix of supervised and unsupervised learning.

Image: The Application of AutoML Techniques in Diabetes Diagnosis: Current Approaches, Performance, and Future Directions

PRODUCTION –DESIGN
MACHINE LEARNING

HEURITECH

Heuritech leverages AI for fashion trend detection, reducing forecasting errors by 50%. By accurately predicting trends and optimizing production, they help fashion brands avoid overproduction and reduce waste.

Benefit
PREDICTIONS

Image: Heuritech

PRODUCTION – DESIGN
MACHINE LEARNING

MACHINE LEARNING (ML)

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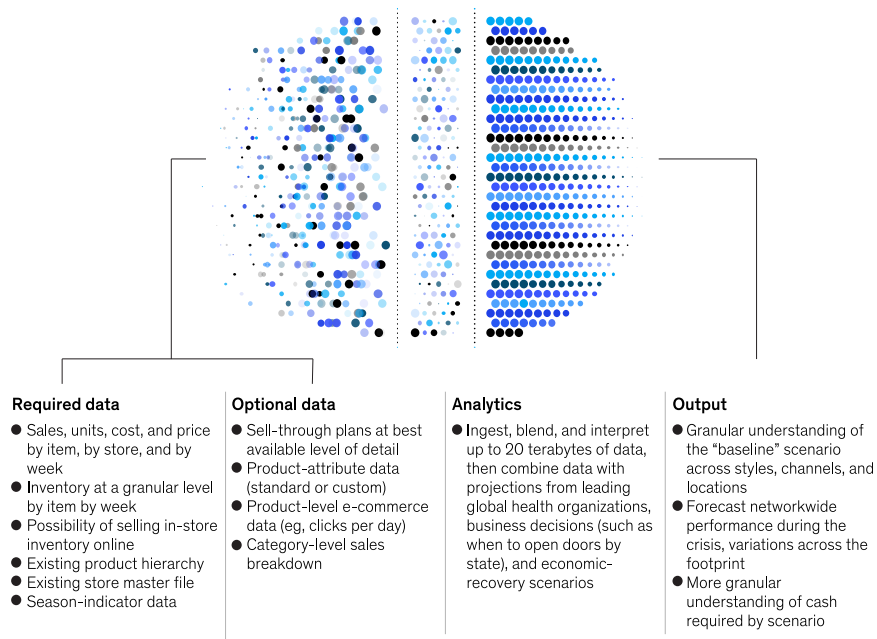
Digital and analytics can transform domains in every part of the apparel value chain.

Image: A Deep-Learning-Based Fashion Attributes Detection Model

Required data	Optional data	Analytics	Output
● Sales, units, cost, and price by item, by store, and by week	● Sell-through plans at best available level of detail	● Ingest, blend, and interpret up to 20 terabytes of data, then combine data with projections from leading global health organizations, business decisions (such as when to open doors by state), and economic-recovery scenarios	● Granular understanding of the "baseline" scenario across styles, channels, and locations
● Inventory at a granular level by item by week	● Product-attribute data (standard or custom)		● Forecast networkwide performance during the crisis, variations across the footprint
● Possibility of selling in-store inventory online	● Product-level e-commerce data (eg, clicks per day)		● More granular understanding of cash required by scenario
● Existing product hierarchy	● Category-level sales breakdown		
● Existing store master file			
● Season-indicator data			

McKinsey & Company

PRODUCTION – DESIGN
3D SCANNING

FARFETCH WITH BALENCIAGA

Balenciaga fall/winter 2021 blurred the lines between the virtual world and reality this season, showcasing a pre-fall 2021 collection via a virtual game entitled 'Afterworld: The Age Of Tomorrow'.

Benefit
REDUCE RESOURCES

Image: Balenciaga and Farfetch

PRODUCTION – DESIGN
3D SCANNING

3D SCANNING

3D scanning is the process of analyzing a real-world object or environment to collect three dimensional data of its shape and possibly its appearance. There are a variety of technologies for digitally acquiring the shape of a 3D object:

Photogrammetry
Multiple cameras used to capture colour 3d data from macro to motion.

Structured Light
Portable production ready full colour scans in minimal processing time.

Laser Scanning
Capture micron level precision with our non contact laser line probe.

3D Lidar
Submillimeter precision laser scanning from up to 110 metres away.

Confocal Microscopy
Microscopic laser beam technology building submicron data layer at a time.

Computed tomography
Non-destructive X-ray projections capturing micro internal and external details.

Image: Web
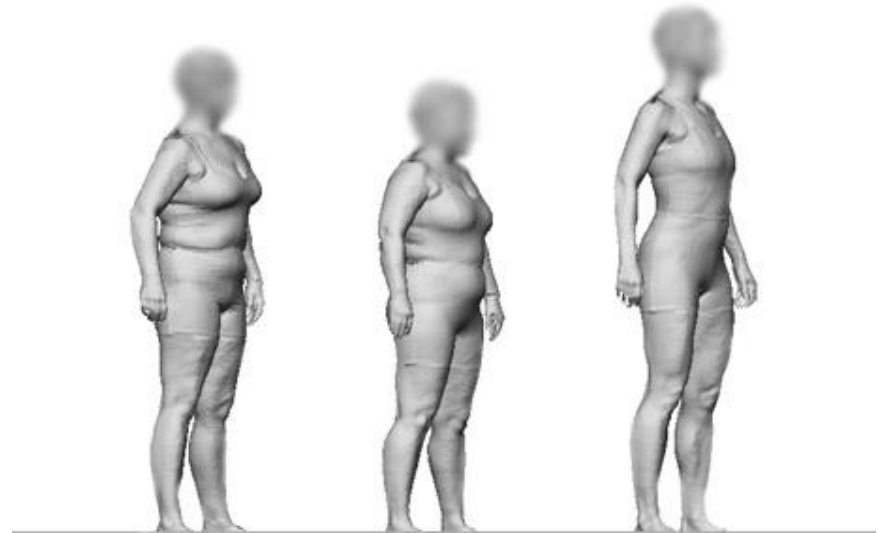
PRODUCTION – DESIGN

DIGITAL TWIN

INDG

INDG is a technology company specialising in large-scale CGI content creation, brand-aligned automated content generation, and photorealistic digital twin production. Digital twins and product visualization for fashion brands at scale.

Benefit
REDUCE RESOURCES

Image : Indg

PRODUCTION – DESIGN
DIGITAL TWIN

DIGITAL TWIN

Digital twins are **virtual representations of physical** products, systems, or processes. They are created using digital models that mirror the characteristics and behavior of their real-world counterparts. Technologies used are: artificial intelligence (AI), machine learning, 3D modeling, and the Internet of Things (IoT).

Image: Web
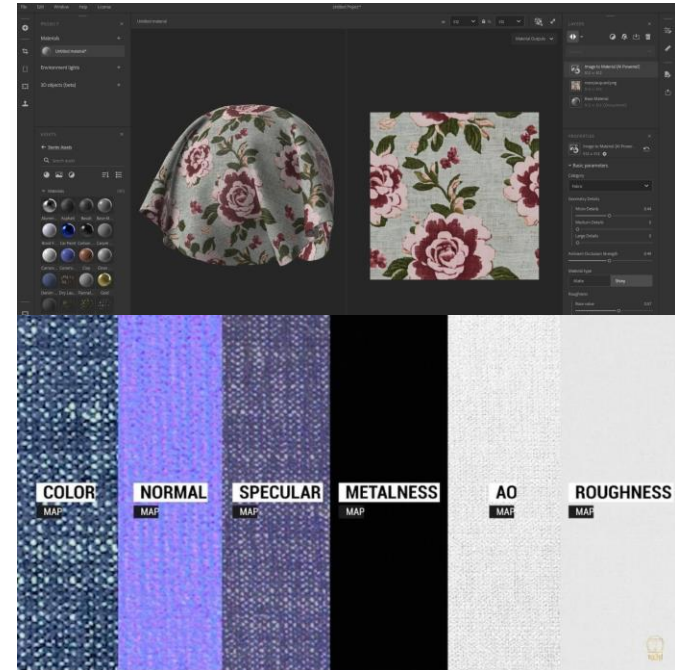
PRODUCTION – DESIGN
AVATAR

PHOTOGENICS MEDIA

Photogenics is launching an avatar division, giving brands talent to work with in the metaverse that's a departure from past iterations of digital-only personalities. All avatars are based on models currently signed to the agency, and act as their "alternate egos" for the metaverse.

Benefit
REDUCE RESOURCES

Image: Photogenics media

PRODUCTION – DESIGN
AVATAR

GRAPHICAL REPRESENTATION

In computing, an avatar is a graphical representation of a user. Avatars can be **two-dimensional** icons known as profile pictures, user pics, or formerly icons. Alternatively, an avatar can take the form of a **three-dimensional** model, as used in online worlds and video games, or an imaginary character with no graphical appearance.

Image: Web/ Dazen

PRODUCTION – DESIGN
VIRTUAL SAMPLING

THE FABRICANT

The company designs clothes that only exist on screens, and not in the physical world. The firm is helping brands create alternatives to fashion shows, trade fairs and the traditional shopping experience to help facilitate a more sustainable ecosystem.

Benefit
SIMULATION FORM

Image: The fabricant

PRODUCTION – DESIGN
VIRTUAL SAMPLING

3D COMPUTER GRAPHIC (3D MODELING)

Pioneering software platforms started to emerge, focusing on the specific needs of fashion designers, such as fabric behavior simulation and pattern development.

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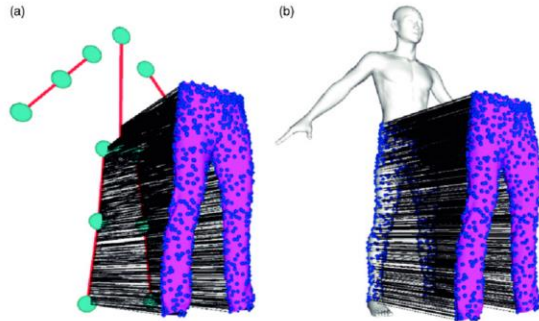
Image: Web

Image: Web

PRODUCTION – DESIGN
VIRTUAL SAMPLING

Image: Laura Civetti
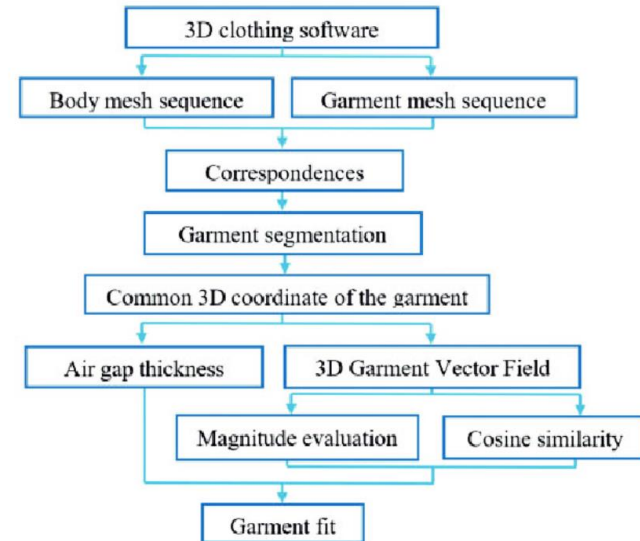
PRODUCTION – DESIGN
3D MODELING

SCRY

SCRY is a pioneering footwear laboratory, founded in 2020. SCRY lab takes footwear as the research object to explore the possibilities of future design and manufacturing. Working on the intersection of art, design, technology, culture, and environment, we try to bring cutting-edge innovation into real life.

Benefit
FREDOM SHAPE

PRODUCTION – DESIGN
3D MODELING

MAYA

Autodesk Maya, commonly shortened to just Maya, is a 3D computer graphics application. It is used to create <u>assets</u> for interactive 3D applications (including video games), animated films, TV series, and visual effects.

Image: Scry

PRODUCTION – DESIGN
COMPUTATIONAL DESIGN

Image: Laura Civetti
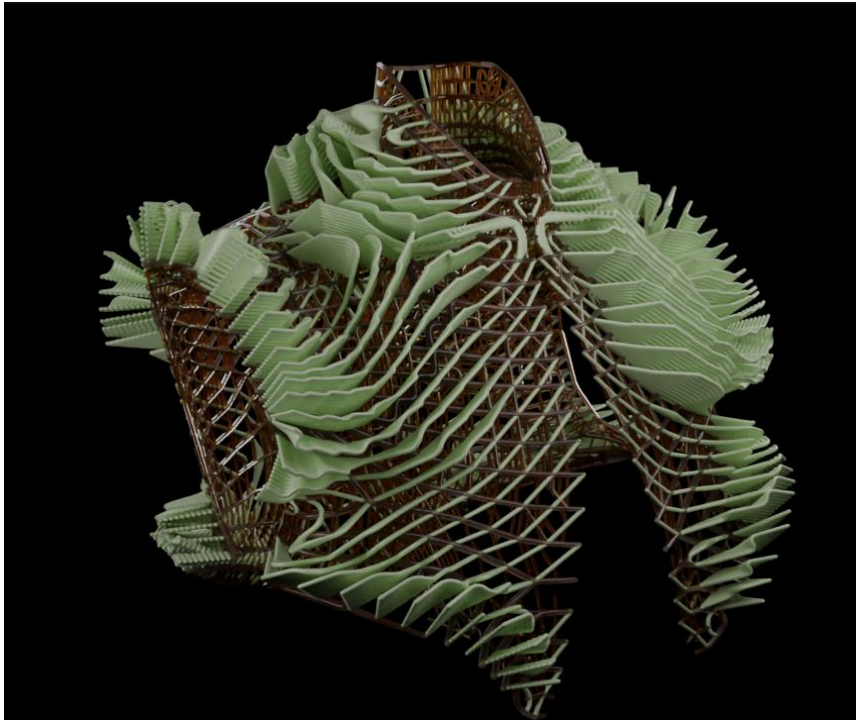
ADAPRIVE FASHION

The "Adaptive Fashion: Procedural Design with Bio-Materials" explore design methodologies merging data-driven geometries using bio-materials.
This methodology is focused on creating adaptive, second-skin textiles for the human body and to generate complex patterns and material recipes that respond to environmental data, enhancing functionality and sustainability in fashion design.

Benefit
CUSTOMIZATION

PRODUCTION – DESIGN
COMPUTATIONAL DESIGN

GRASSHOPPER

Grasshopper is a visual programming language and environment that runs within the Rhinoceros 3D computer-aided design (CAD) application.

Image: Web
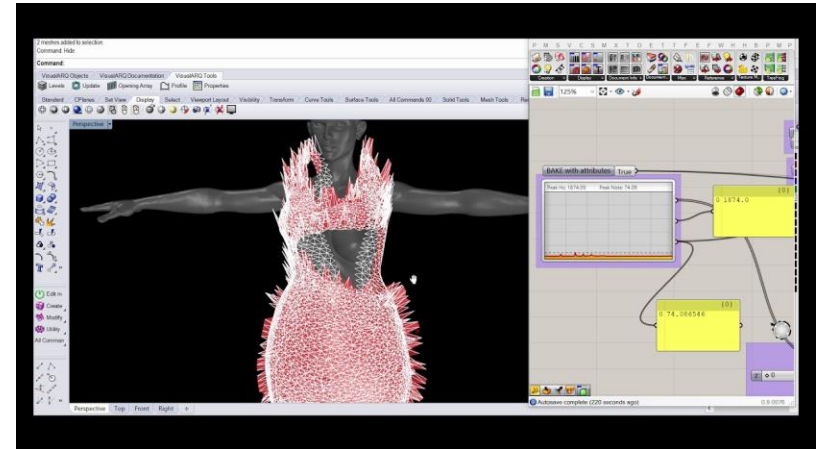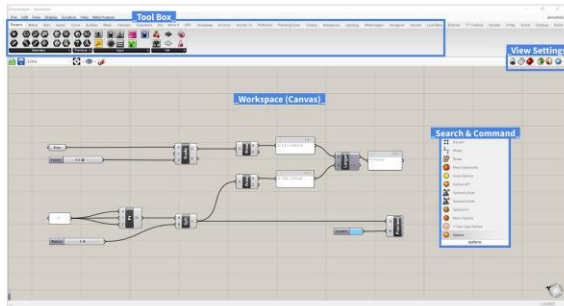
PRODUCTION – MANUFACTURING
3D MODELING
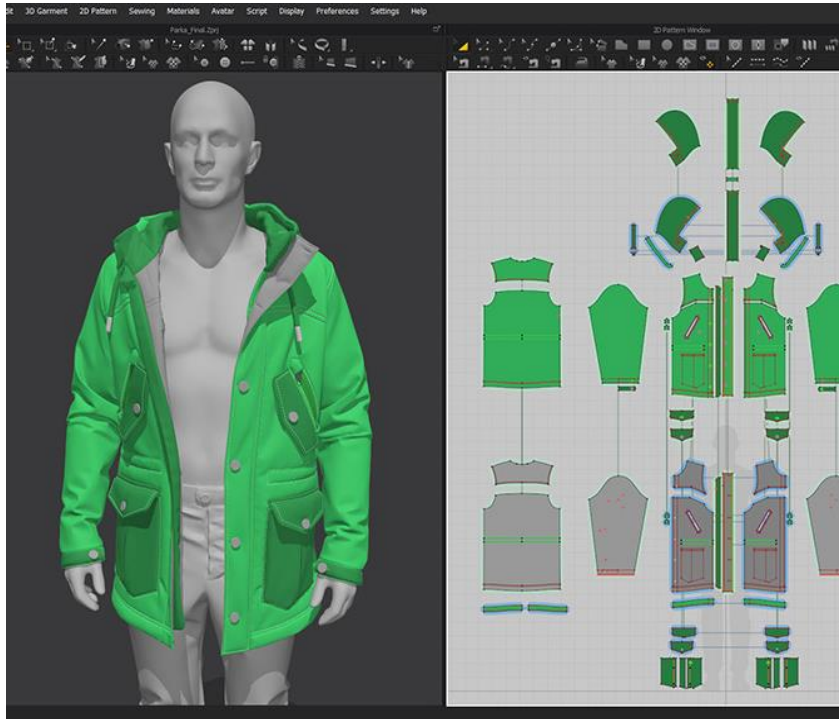
CLO3D

Clo3D is software for 3D clothing design. Produced by industry giant Clo Virtual Fashion, it exists to assist you in sustainable fashion design. The software allows you to create and alter virtual, true-to-life garments with physical sampling and shipping removed from the process.

Benefit
INCREASED ED EFFICIENCY

PRODUCTION – MANUFACTURING
3D MODELING

DIGITAL PATTERN MAKING

Digital patterns are virtual files that encompass every detail of a piece of garment to be produced.
Digital patterns enable a more efficient workflow, optimizing the creation and production processes.
By utilizing digital patterns, clothing companies can accelerate their production timelines, ensuring faster and more accurate manufacturing.
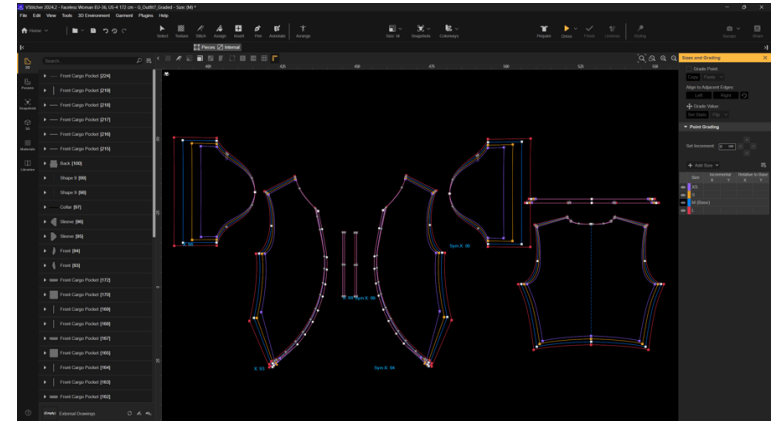
Image: Browzwear

PRODUCTION – MANUFACTURING
KNITTING

MIT SELF-ASSEMBLY LAB

The 4D Knit Dress is a combination of heat-activated yarns, computerized knitting, and 6-axis robotic activation, resulting in a garment that is sculpted to provide a personalized fit or style. Heat-activated yarns are embedded within a unique knit structure, enabling controlled transformation while maintaining softness, stretch and resilience.

Benefit
PERSONALIZATION

Image: MIT Self-assembly lab, 4D Knit dress

PRODUCTION – MANUFACTURING
KNITTING

3D KNITTING

The 3D KNIT is a textile technology that consists of weaving a product directly from the yarn rather than creating a fabric. It makes it possible to obtain different features and shapes with no seams, using a single raw material.

Image: Oliver Charles

PRODUCTION – MANUFACTURING
ADDITIVE MANUFACTURING

JASNA ROLEGEM AND TRAVIS FITCH

Jasna Rok Lab combin innovative fashion and cutting-edge technology whose work focuses on the physiology of feelings. Jasna Rokegem worked in collaboration with 3D Designer Travis Fitch, using both Rhino and CLO3D software to translate EQ to 3D algorithmic structures.

Benefit
PERSONALIZATION

Image: Web Jasna Rolegem and Travis Fitch

PRODUCTION – MANUFACTURING
ADDITIVE MANUFACTURING

ADDITIVE MANUFACTURING (AD)

It is an industrial process used to manufacture objects starting from computerized 3D models, adding one layer on top of the other, as opposed to traditional subtractive manufacturing methodologies.

Types of Additive Manufacturing in 3D Printing
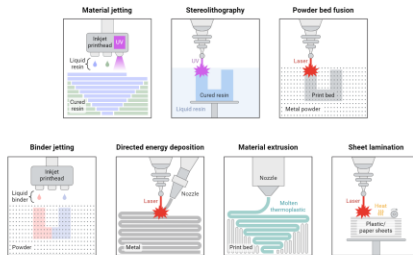
Image: Web

POLYJET

PolyJet is a multi-material jetting photopolymer 3D printing technology that have exceptional precision and versatility.
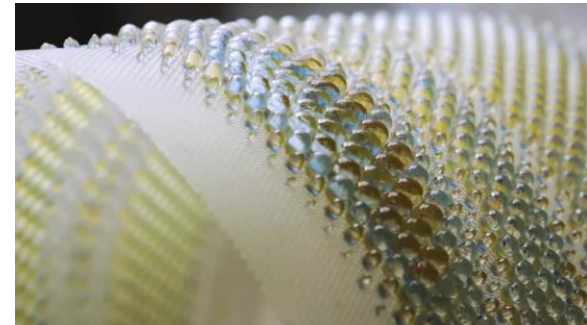
Image: Stratasys

RETAILS

DISTRIBUTION

SHOP

CUSTOMER EXPERIENCE

Image by Laura Civetti

RETAIL – DISTRIBUTION
DIGITAL WORLDS
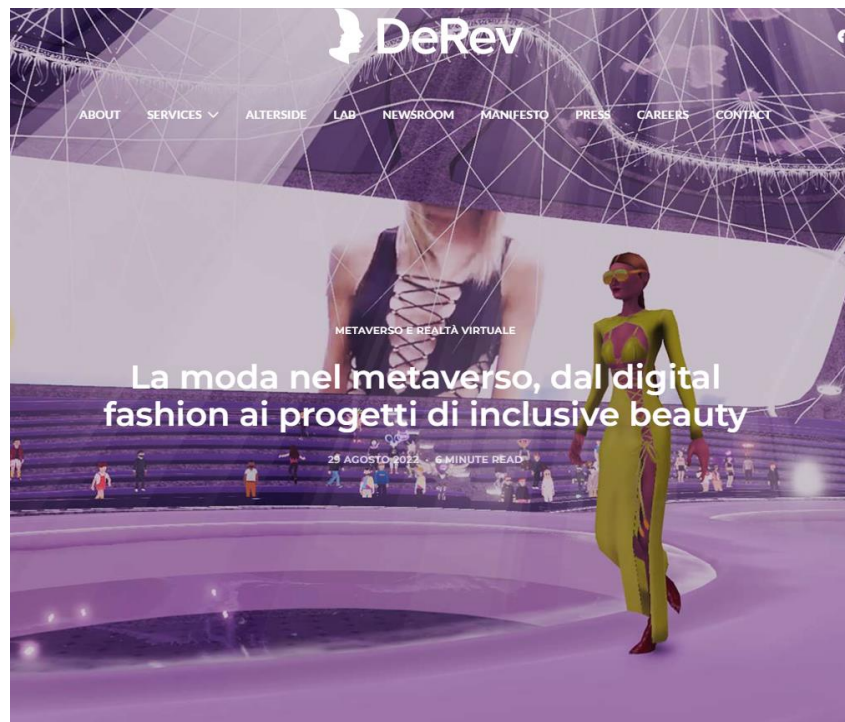
DEREV

DeRev deals with digital strategy, identity and positioning, community engagement, and communication and marketing on the web, social media and virtual environments.

Benefit
XX

RETAIL – DISTRIBUTION
DIGITAL WORLDS

METAVERSE

Digital worlds merge virtual platforms where creators trade digital clothing and fabric patterns (often as NFTs), blending fashion and gaming for avatar customization and immersive experiences.

The metaverse, is one of the virtual worlds in which users represented by avatars interact, usually in 3D and focused on social connection.

Image: Microfoft

RETAIL – DISTRIBUTION
DIGITAL PRODUCTS

LOUIS VUITTON

The blockchain creates a "digital twin" for its registered luxury products and can verify authenticity of items through user-uploaded images.
The project is a "voyage of creation with Web.3" which will take "owners on a journey unlike any other before"

Image: Via, Louis Vuitton

RETAIL – DISTRIBUTION
DIGITAL PRODUCTS

NON-FUNGIBLE TOKEN (NFT)

A NFT is a unique **digital identifier** that is recorded on a blockchain and is used to certify ownership and authenticity. It cannot be copied, substituted, or subdivided

Image: "Everydays: The First 5000 Days", Mike Winkelmann
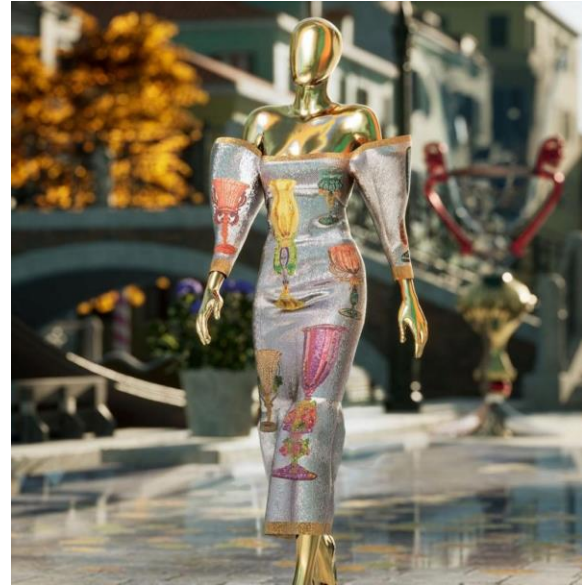
Image: Dolce e Gabbana

PRODUCTION –DESIGN
MACHINE LEARNING

HEURITECH

Heuritech leverages AI for fashion trend detection, reducing forecasting errors by 50%. By accurately predicting trends and optimizing production, they help fashion brands avoid overproduction and reduce waste.

Benefit
PREDICTIONS

Image: Heuritech

PRODUCTION –DESIGN
MACHINE LEARNING

MACHINE LEARNING (ML)

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Digital and analytics can transform domains in every part of the apparel value chain.

Image: A Deep-Learning-Based Fashion Attributes Detection Model

| Groundtruth Bounding Box |
| Positive Proposal |
| Ignored Proposal |
| Negative Proposal |
| Person Bounding Box |
| Pruned Proposal |

Required data

- Sales, units, cost, and price by item, by store, and by week
- Inventory at a granular level by item by week
- Possibility of selling in-store inventory online
- Existing product hierarchy
- Existing store master file
- Season-indicator data

Optional data

- Sell-through plans at best available level of detail
- Product-attribute data (standard or custom)
- Product-level e-commerce data (eg, clicks per day)
- Category-level sales breakdown

Analytics

- Ingest, blend, and interpret up to 20 terabytes of data, then combine data with projections from leading global health organizations, business decisions (such as when to open doors by state), and economic-recovery scenarios

Output

- Granular understanding of the "baseline" scenario across styles, channels, and locations
- Forecast networkwide performance during the crisis, variations across the footprint
- More granular understanding of cash required by scenario

McKinsey & Company

RETAIL – SHOP/FITTING
AR

ZERO 10

Zero10, an AR clothing try-on technology providing innovative tech solutions for brands in the digital world. The meaning behind the name is "when something new and cutting-edge comes to replace the old and outdated," as Co-Founder and CEO George Yashin told Fashinnovation.

Benefit
VIRTUAL FITTING

Image: Zero 10

RETAIL – SHOP/FITTING
AR

AR

Augmented reality (AR) is a technology, superimposes virtual content onto the real-world environment via smartphones or other enabled electronic devices. AR incorporates three basic features: a combination of real and virtual worlds, real-time interaction, and accurate 3D registration of virtual and real objects.

VIRTUAL TRY-ON

VTO allows customers to virtually try on clothes, accessories, and makeup, enabling them to visualize how these items would look on their bodies.

Image: Wanna fashion

RETAILS – CUSTOMER EXPERIENCE
VR

VIRTUAL REALITY VENTURES

Samsung partnered with FTL Moda to create the first all-digital fashion presentation. Inspired by an Italian theme, the video was shot in digital and 360-digital in Milan earlier this month.

Benefit
VIRTUAL SHOW

Image: Samsung

RETAILS – CUSTOMER EXPERIENCE
VR

VIRTUAL REALITY (VR)

Virtual reality (VR) is a simulated experience that employs 3D near-eye displays and pose tracking to give the user an immersive feel of a virtual world.

Currently, standard virtual reality systems use either virtual reality headsets or multi-projected environments to generate some realistic images, sounds and other sensations that simulate a user's physical presence in a virtual environment.

Image: Design in VR Web /Anad Duncan
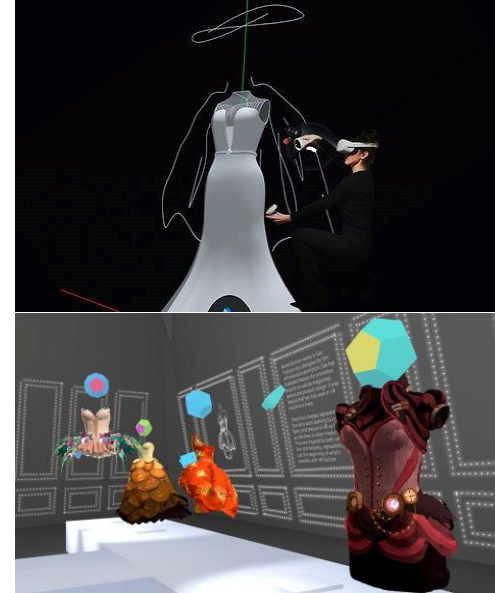
Laura Civetti

Designer and researcher
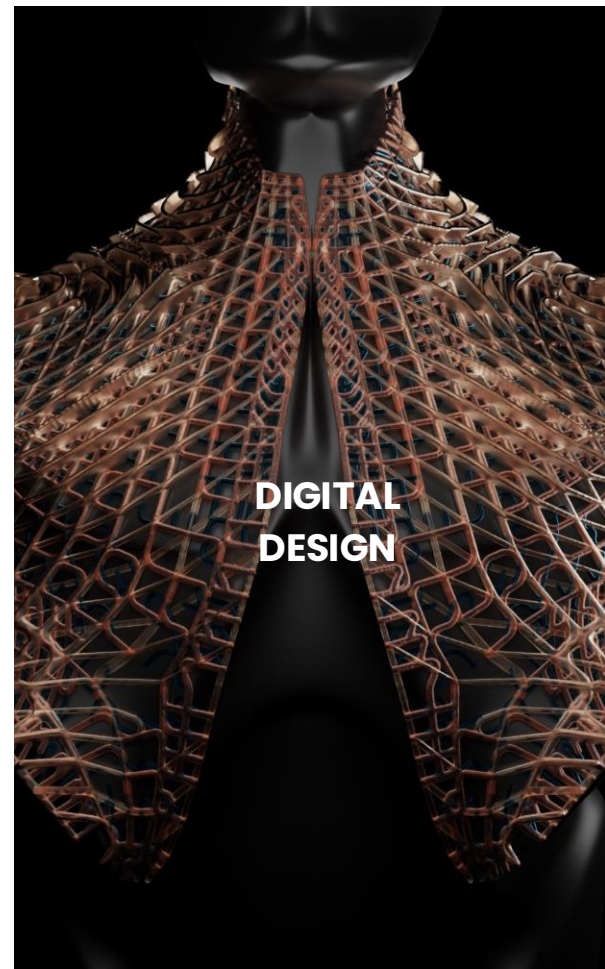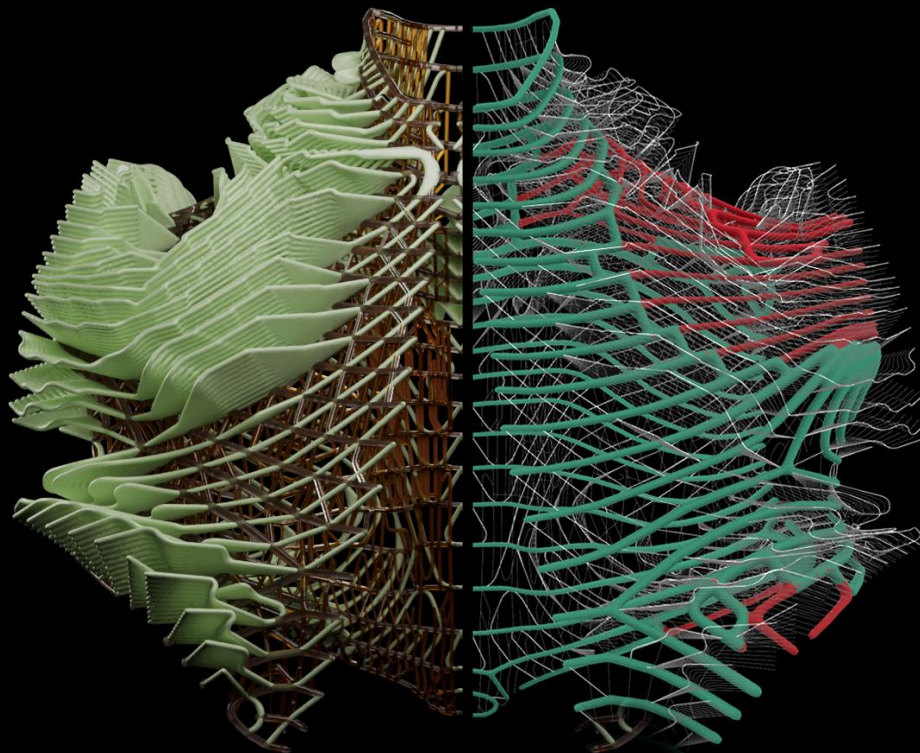
transiti*ns

BIOBASED MATERIALS

ADDITIVE MANUFACTURING

DIGITAL DESIGN

DESIGN METHODOLOGY
ADAPTIVE FASHION

DESIGN METHODOLOGY
ADAPTIVE FASHION
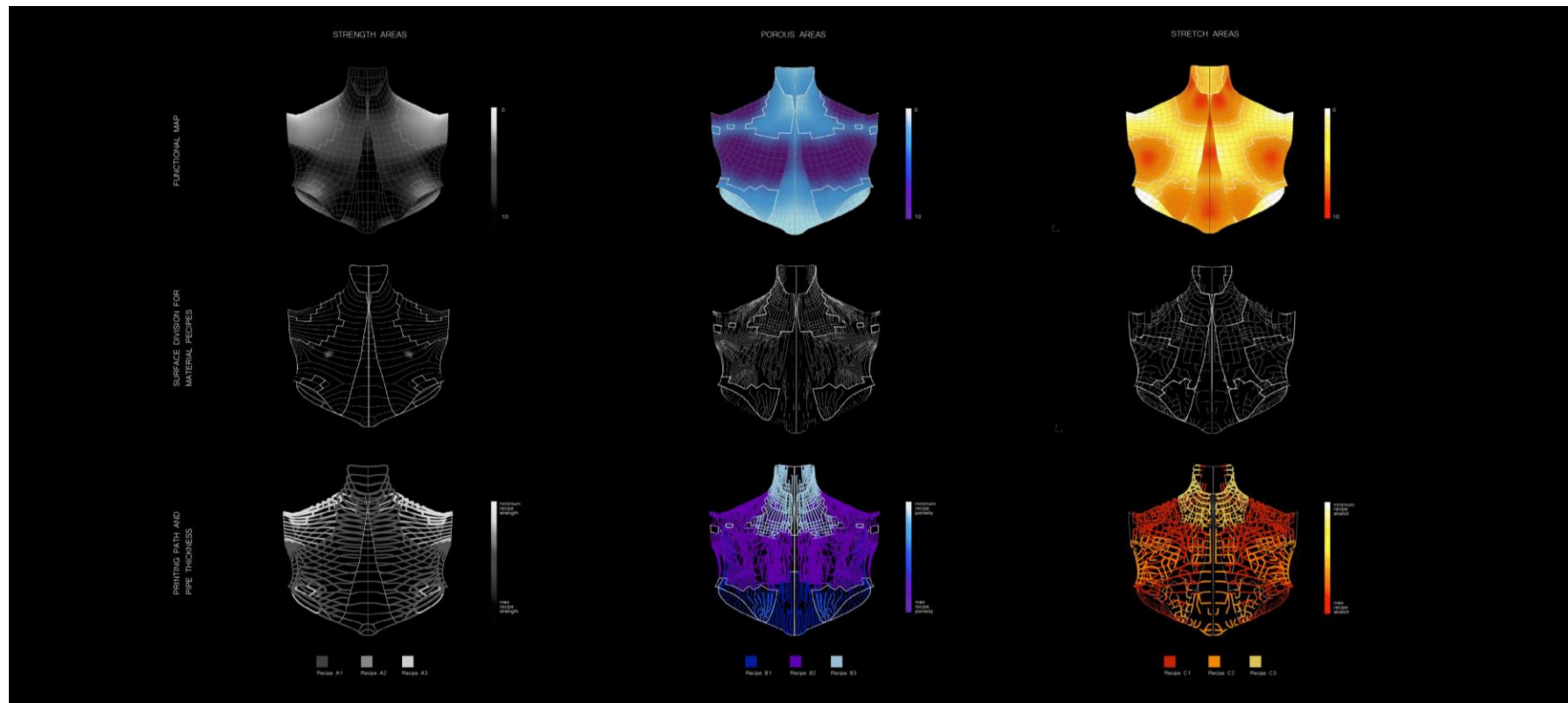
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ADAPTIVE FASHION
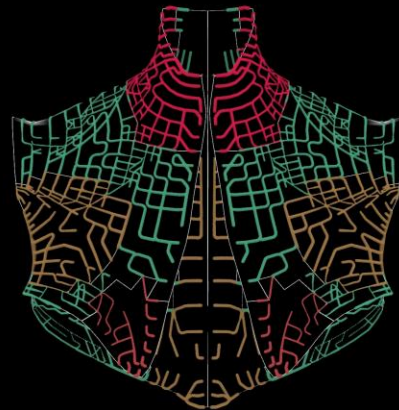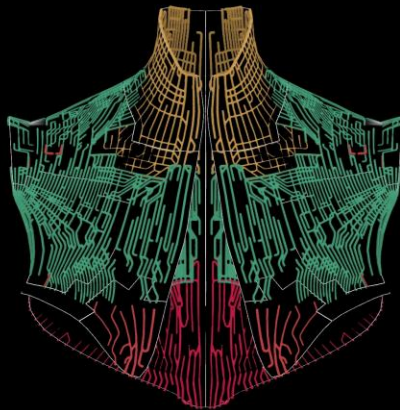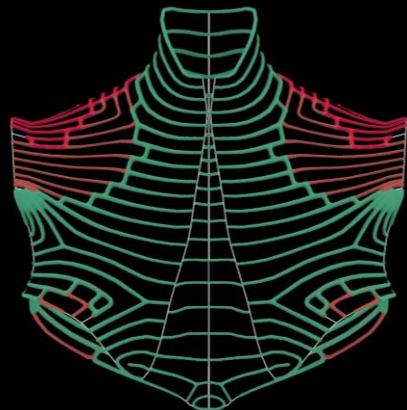
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ADAPTIVE FASHION
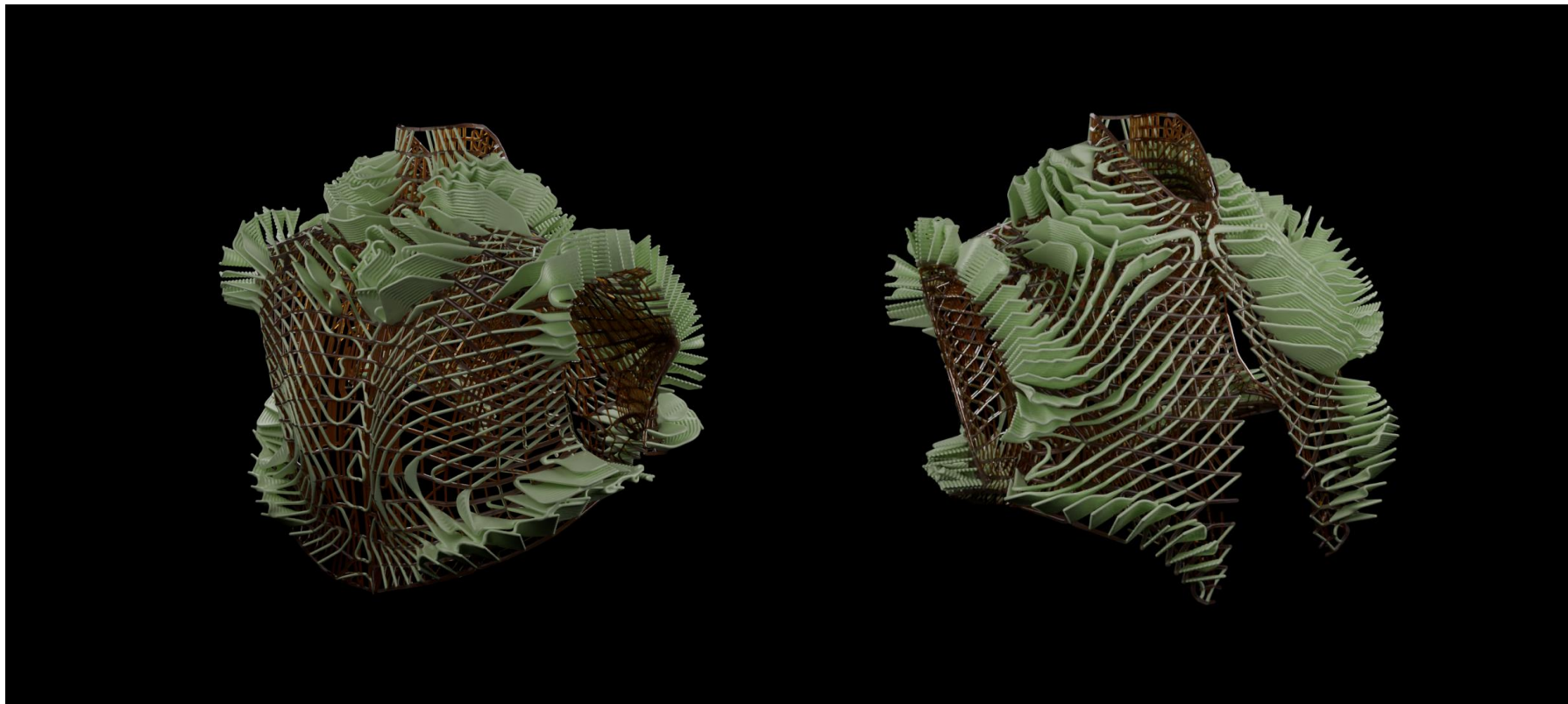
DESIGN METHODOLOGY
TRINITY – 3D PRINTED DRESS

DESIGN METHODOLOGY
TRINITY – 3D PRINTED DRESS
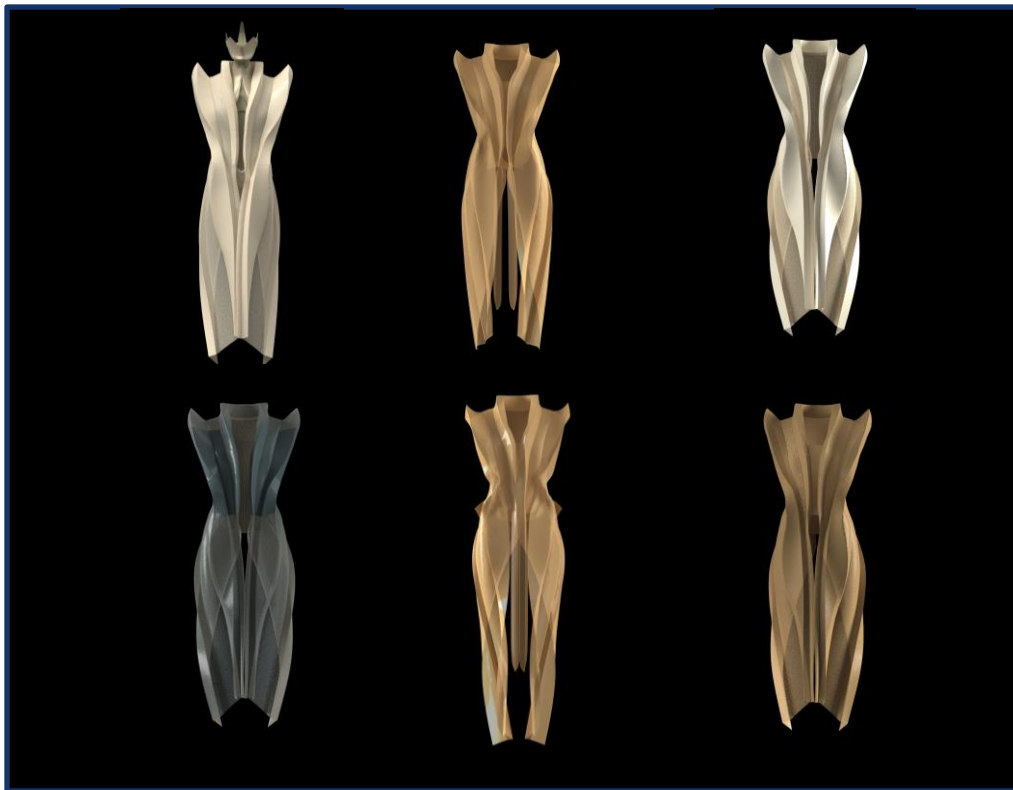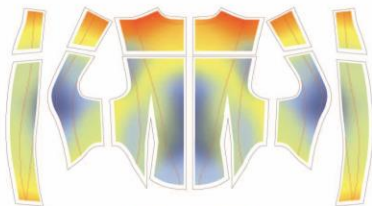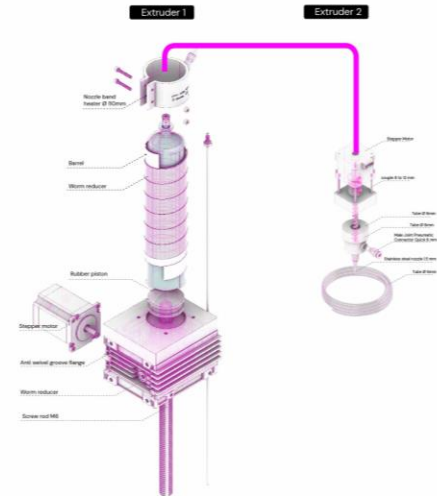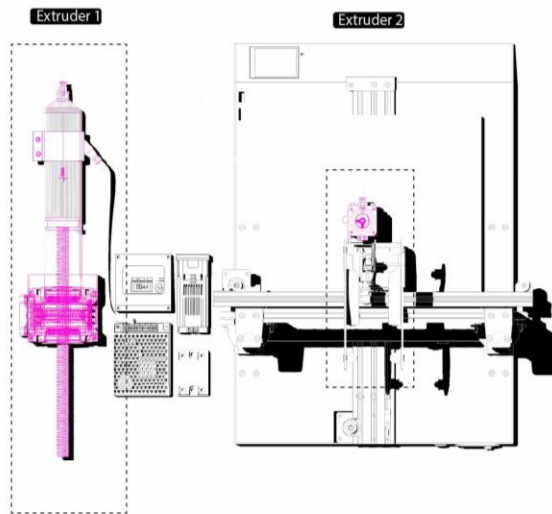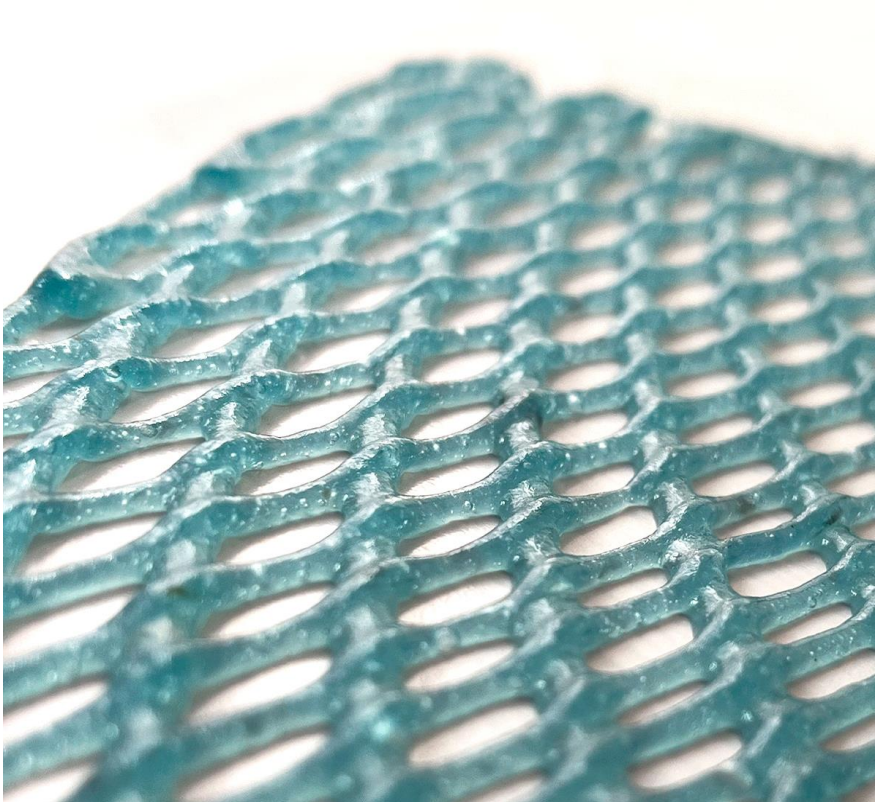
DESIGN METHODOLOGY
TRINITY – 3D PRINTED DRESS

BIO 3D Printing Dress
Design.Methodology
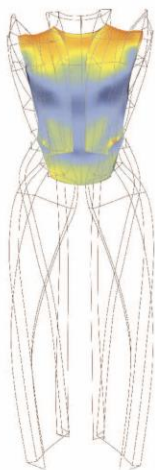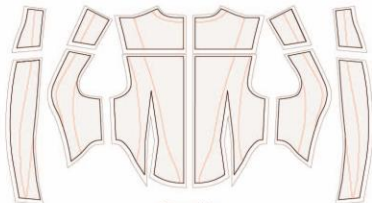
Pattern making

Color gradient surface curvature

Body analysis

20α   90α
surface curvature
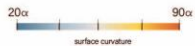
BIO 3D Printing Dress
Design.Methodology
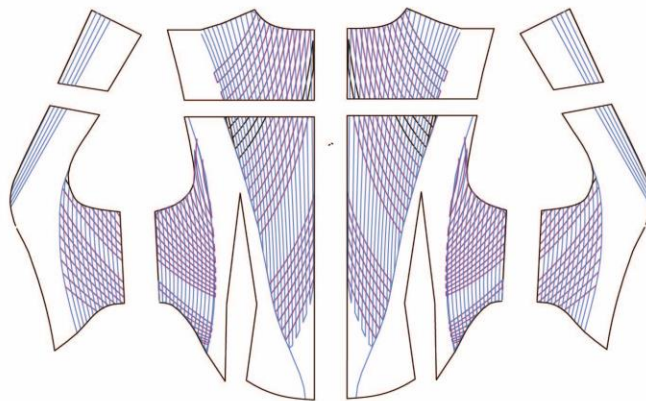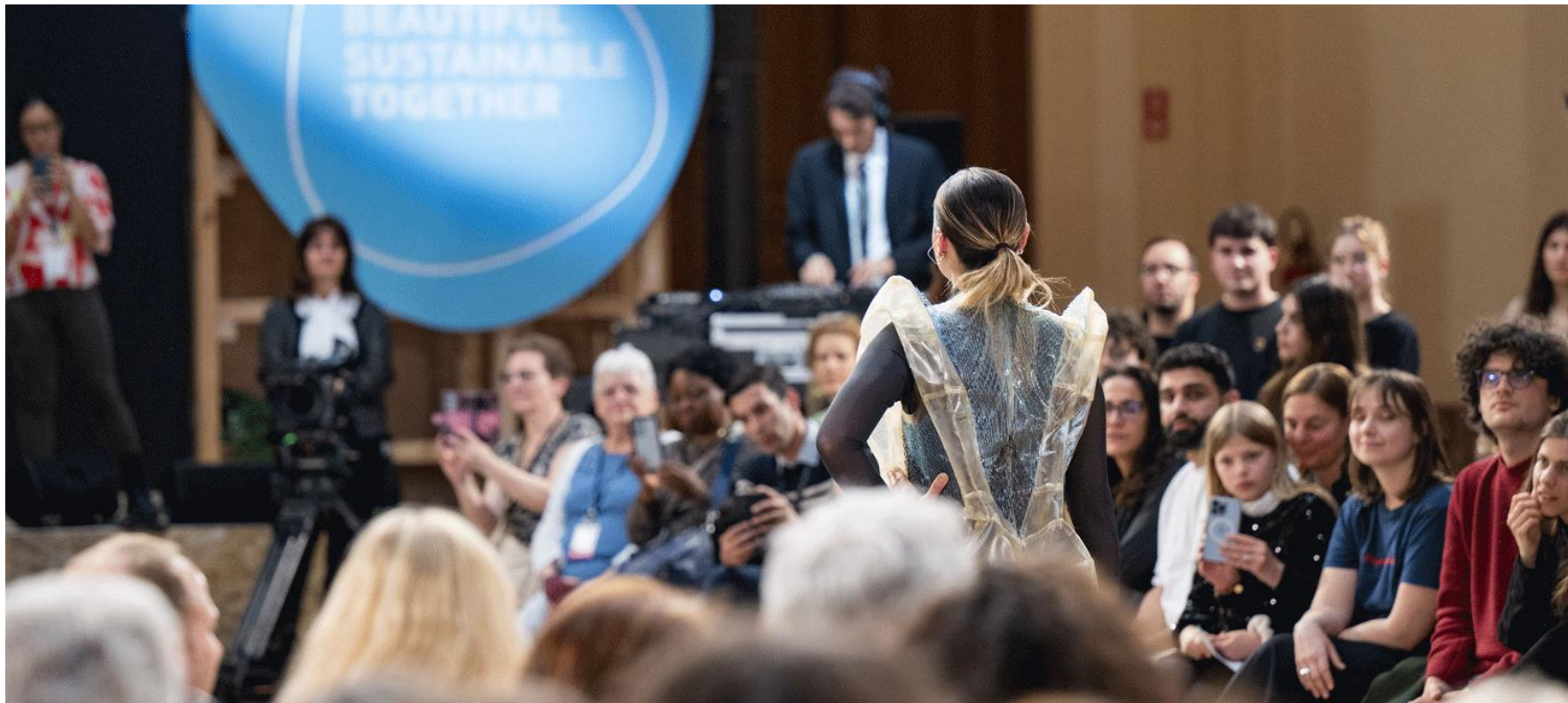
Pattern geometry

DESIGN METHODOLOGY
TRINITY – 3D PRINTED DRESS

DESIGN METHODOLOGY
TRINITY – 3D PRINTED DRESS

DESIGN METHODOLOGY
TRINITY – 3D PRINTED DRESS

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