



# NORDIC BLOCKCHAIN ALLIANCE

# NORDIC BLOCKCHAIN INSPIRATIONAL CATALOG



# EXECUTIVE SUMMARY

## BLOCKCHAIN IN THE NORDIC FASHION, FURNITURE AND DESIGN INDUSTRY

Nordic fashion, furniture and design industries are embarking on a transformative journey towards transparency, sustainability, and innovation. Through inspiring examples and collaborations, these industries are making significant strides in embracing traceability, consumer-facing transparency, circularity, and digital innovation.

By highlighting successful use cases within the Nordic region, we are reminded of the collective progress being made. These examples inspire us to elevate one another and foster a sense of unity within the Nordic community. It is a testament to our commitment to continuous improvement and our shared goal of shaping a responsible and forward-thinking industry.

As we navigate the path towards greater transparency, we recognise that the adoption of blockchain technology is still in its early stages. However, the potential it holds to revolutionise supply chains and enhance consumer trust is undeniable. It catalyzes for positive change and empowers us to explore innovative approaches that elevate the entire industry.



## COLLABORATION AND KNOWLEDGE SHARING IS THE KEY TO SUCCESS

Through collaboration, knowledge sharing, and a shared vision, the Nordics can pave the way for a more sustainable and accountable fashion and design industry. By embracing transparency, leveraging technology, and fostering a culture of continuous improvement, we have the opportunity to inspire one another and collectively create a brighter future.

# KNOWLEDGE POOL

**01** Introduction ..... page 03-08

**02** What is blockchain technology? ..... page 09-11

**03** Blockchain use cases in the fashion, furniture,  
and design industry ..... page 12-25

**04** Blockchain solutions in the fashion, furniture,  
and design industry ..... page 26-29

**05** References and appendix ..... page 30-33

# PURPOSE OF THE BLOCKCHAIN KNOWLEDGE POOL

## NORDIC BLOCKCHAIN ALLIANCE

Nordic design brands are renowned for their responsibility and trusted reputation globally. Imagine if these brands could not only prove their origin but transform it into a competitive advantage.

This is achievable today through blockchain technology, which enables secure and cost-effective data exchange. Blockchain can store various types of information, such as product details, supply chain data, environmental impact, compliance records, contract information, user instructions, and more. These blockchain-based solutions can also support circular business models and pave the way for a future European Product Passport.

The Nordic Blockchain Alliance aims to harness the potential of collaboration among Finland, Norway, Sweden, and Denmark. By leveraging diverse experiences and knowledge sources, we explore the possibilities of creating a shared blockchain infrastructure across the Nordic industry.

## PROJECT GOALS

The goal is to support the fashion & furniture industry in this new transition and create new innovations. The project will include a diverse range of lifestyle, creative companies, and start-ups to create and connect a strong knowledge pool across the Nordics regarding the potential of blockchain technology. Moreover, the goal is to analyze experiences and case stories and align this with the EU textile strategy for eco-design and the product passport. This will allow SMEs to access the information and knowledge to support their transition to a more traceable and transparent business.

## TARGET GROUPS

The target group is lifestyle companies that want to act proactively to meet upcoming challenges and possibilities from regulatory or customer demands on transparency and documentation. Moreover, companies that want to explore possible advantages of using blockchain technology to develop and deepen collaboration in a shared value chain. At last, the project wants to attract solution providers, start-ups, and scholars working with specific applications.

## ACTIVITIES

The project will consist of four activities one of which is this blockchain knowledge pool. This catalogue is a collection of known use cases and research that aims to create and connect a strong knowledge pool on blockchain. The goal is to complete a blockchain toolbox for SMEs, supporting them with knowhow on how to get a successful start utilizing blockchain technology.

The project is financed by Nordic Innovation.

Read more about the remaining three activities that will be carried through during the project period [here](#).



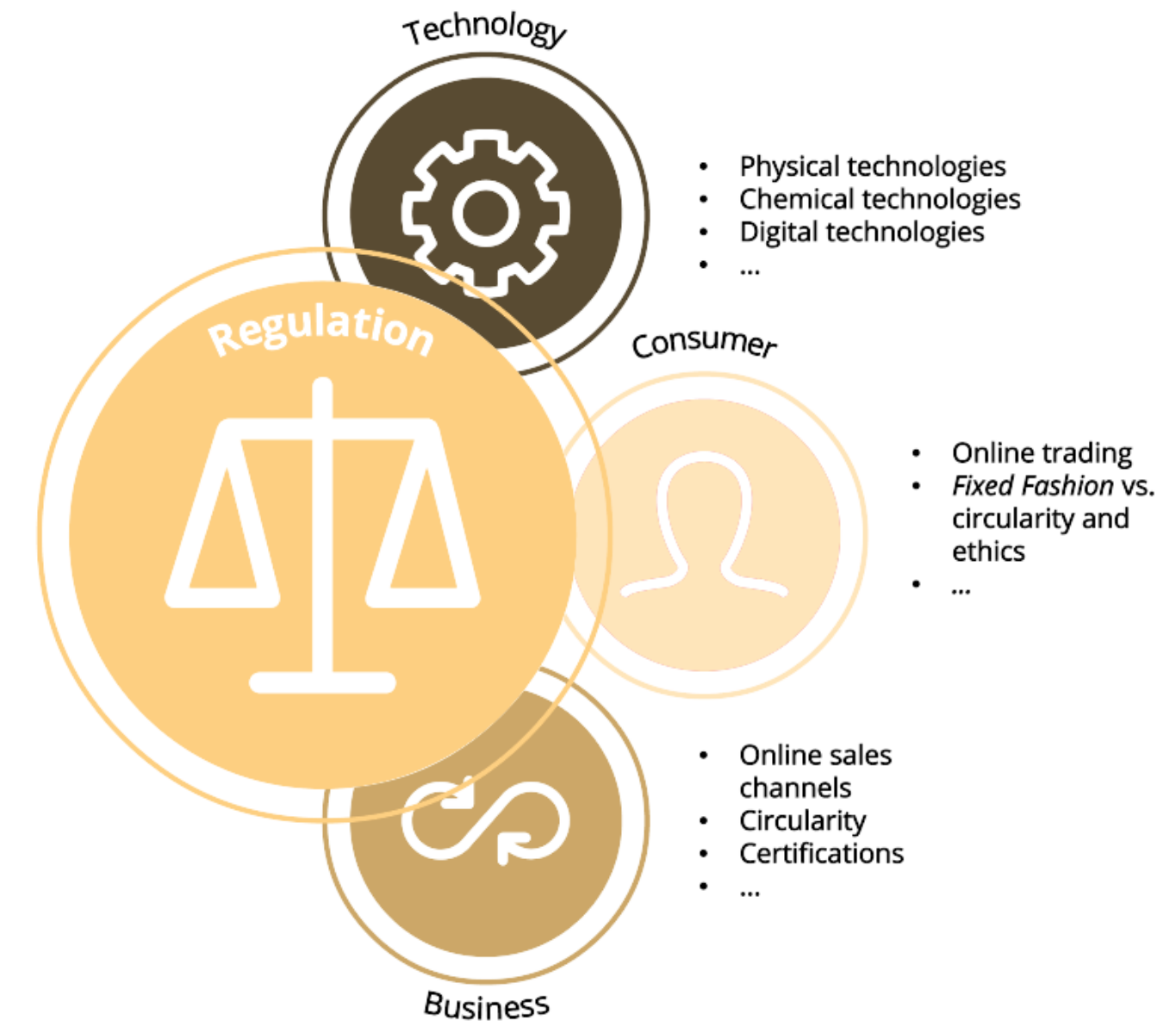
# INDUSTRIENS FOND



# TRENDS IN THE FASHION, FURNITURE AND DESIGN

To gain valuable insights into the business opportunities that blockchain can address in Nordic fashion, furniture and design companies, it is imperative to first comprehend the dynamics of the industry ecosystem. This comprehension entails an examination of four key areas: regulatory, consumer, business, and technological. These areas have emerged as significant focal points based on a thorough analysis of pertinent literature, reports, and articles within the fashion and design domain. It is worth noting that the initiatives and changes transpiring in each of these areas have the potential to directly or indirectly impact one another. For instance, the ambitious climate objectives outlined in the European Green Deal<sup>1</sup> not only represent a regulatory shift but also impel technological advancements and necessitate business transformations as Nordic companies strive to meet these environmental goals.

In this specific context, the scope of this catalog is dedicated exclusively to exploring regulatory trends, given their universal impact on both small and large Nordic enterprises, while simultaneously fostering transparency. The forthcoming page will provide a description of the regulatory trends; however, it is important to recognize that this coverage may not be exhaustive, as this domain constantly evolves with new proposals for EU legislation. To remain informed about the latest legislative proposals and news from the European Commission, it is advisable to stay updated through their official channel.



# TRENDS IN THE FASHION, FURNITURE AND DESIGN

In late March 2022, the European Commission unveiled the EU Strategy for Sustainable and Circular Textiles(2) as part of the broader Circular Economy Action Plan(3), signifying a pivotal step in the green transition of the textile industry. The textile strategy aims to ensure that all EU textile products are durable, recyclable, and socially responsible by 2030. It seeks to establish uniform EU regulations through the Ecodesign for Sustainable Products (ESPR) initiative. While the Waste Framework Directive addresses waste management and producer responsibility, the ESPR focuses on integrating environmental considerations into textile design and production. The proposed ecodesign regulation aims to remove environmentally harmful products from the European market by 2030.

In alignment with the EU Circular Economy Action Plan, the concept of Digital Product Passport(3) (DPP) was introduced. The DPP will necessitate businesses operating in sectors such as textiles and furniture to provide digital product information accessible to consumers. This information may encompass product specifications, recyclability details, and energy efficiency information. The DPP aims to facilitate product repair and reuse while enhancing supply chain transparency.

[CLICK HERE FOR MORE](#)

[EU textile strategy](#)

[EU Circular Economy  
Action Plan](#)

[Ecodesign for sustainable products  
regulation](#)

[Digital product passport](#)

[EU Regulation on deforestation-free  
supply chains](#)

[Waste framework directive](#)

Furthermore, the EU has put forth a new proposal for an EU Regulation on deforestation-free supply chains. This regulation will mandate that all relevant companies wishing to market products (such as leather, furniture, and wood) in the EU or export them must provide evidence that the products are legally sourced and free from deforestation (land that has not undergone deforestation after December 31, 2020). Upon the regulation's enforcement, stakeholders and negotiators will have 18 months to implement the new rules.

While there are additional regulatory changes beyond those mentioned, this catalogue focuses specifically on initiatives presented by the European Commission, considering the target audience of Nordic countries. EU legislation is expected to significantly impact on businesses of all sizes within the fashion, furniture, and design industry. For an overview of the initiatives stemming from the European Green Deal that are relevant to the fashion and design industry, please refer to the subsequent page. The textile strategy seeks to discourage the prevalence of fast fashion, and the measures required to achieve this goal.



# SELECTED EU STRATEGIES & LEGISLATION AFFECTING THE FASHION, FURNITURE AND DESIGN INDUSTRY

## Corporate Sustainability Reporting Directive<sup>7</sup>

- Companies must report on the environment, including climate, social conditions and corporate governance. The report must be given in the annual report and provided with an auditor's opinion
- 2024: Large public-interest companies with over 500 employees must report according to CSRD
- 2026: Listed SMEs will subsequently be subject to the requirements (may refrain from reporting until 2028)
- CSRD continues to evolve and is complemented by [CSDDD](#)

## EU Taxonomy<sup>6</sup>

- A list of economic activities that are sustainable
- Helps investors identify sustainable investment opportunities
- *Do No Significant Harm*

## Climate neutral 2050<sup>1</sup>

- European Green Deal adopted in 2020
- Ambitious goal for the EU to be climate neutral by 2050
- Legally binding cf., the Climate Act



## Strategy for sustainable and circular textiles<sup>2</sup>

- EU Circular Economy Action Plan
- *"Make fast Fashion go out of Fashion"*
- ÷ Microplastic pollution
- ÷ Textile waste and destruction of unsold products
- 2023: Increased producer responsibility
- 2024: The minimum requirements shall be drawn up
- 2030: Textile products have a long lifespan, are recyclable, and manufactured under ethical conditions

## Chemical Strategy for Sustainability<sup>8</sup>

- ÷ Ban the most harmful chemicals in consumer products according to REACH
- ÷ Phase out PFAS in the EU, unless their use is essential
- Pay attention to the cocktail effect of chemicals
- Establish a simpler "one substance, one assessment" process for assessing the risks and hazards of chemicals

## Deforestation strategy<sup>5</sup>

*"... all relevant companies will have to conduct strict due diligence if they place on the EU market, or export from it: palm oil, (...), timber and rubber as well as derived products (such as beef, furniture, or chocolate). Traders must prove that the products were produced on land that has not been subject to deforestation after 31/12-20<sup>15</sup> – EU*

# THE DIGITAL PRODUCT PASSPORT

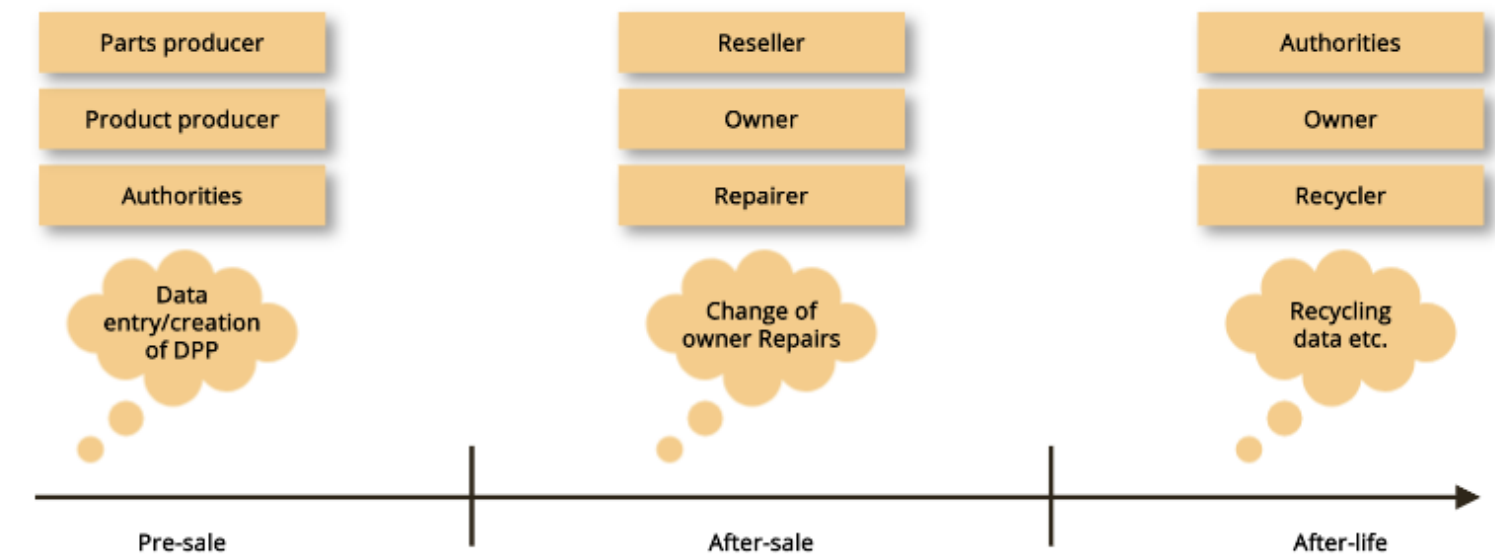
## BREAKING DOWN THE DIGITAL PRODUCT PASSPORT

The Digital Product Passport (DPP) is a transformative necessity and a game-changer for the Nordic fashion and design industry. It serves as a digital record, documenting a product's lifecycle from inception to end-of-life. The DPP is expected to impact value chains, globally given that all products placed on the EU market will be affected. Many elements of the DPP remain open across scope, tech setup, and data in the current regulation. However, despite these elements being available, Nordic fashion and design companies in scope should start organising around the DPP, and as regulations around the DPP continue to evolve, embracing this digital passport becomes even more imperative.

Nordic Blockchain Alliance have tested with the Swedish company Sigma how the design industry could start looking at this. They recommend looking at the DPP encompass three vital phases: pre-sale, after-sale, and after-life. In the pre-sale phase, the DPP evolves dynamically as key information is added. Designers, manufacturers, and suppliers contribute details such as origin, materials, and certifications, fostering transparency and meeting future demands.

After-sale, the DPP takes a more static form, providing comprehensive information to resellers, owners, and repairers. It streamlines processes for maintenance, repair, and ownership transfers, ensuring customer satisfaction. Moreover, it allows for recording post-sale activities, such as repairs and ownership changes, thereby prioritizing quality and longevity.

## Sigma Technology: Model for the digital product passport lifecycle:



In the after-life phase, the DPP serves as a centralised information-gathering tool. Recycling organisations rely on it to determine appropriate recycling methods based on product composition, while authorities gather valuable statistics on lifespan, repairs, and recycling data. This promotes sustainability and enables evidence-based policies.

The DPP's significance is further augmented by its implementation of blockchain technology, which we'll explore in more detail in subsequent pages. Embracing the DPP is essential for Nordic fashion, furniture and design companies to thrive in the future, positioning themselves as industry leaders committed to compliance, transparency, sustainability, and responsible practices.





# NORDIC BLOCKCHAIN ALLIANCE

## 2 | WHAT IS BLOCKCHAIN TECHNOLOGY?



# WHY BLOCKCHAIN?

*Blockchain technology can **increase traceability, transparency, authenticity, and compliance** in the fashion and furniture industry. Common for all is that the blockchain technology brings **increased trust and credibility** with all participants since data on a blockchain is immutable.*





# LEVERAGING BLOCKCHAIN TECHNOLOGY TO INCREASE TRUST

Blockchain technology can increase traceability, transparency, authenticity, and compliance. Common for all is that the blockchain technology brings increased trust and credibility with all participants, since data on a blockchain is immutable.

## TRACEABILITY

Blockchain technology can be used to track the movement of goods and products along the supply chain, providing a transparent and immutable record of their origin, location, and ownership. This can help improve product traceability and reduce counterfeiting

## AUTHENTICITY

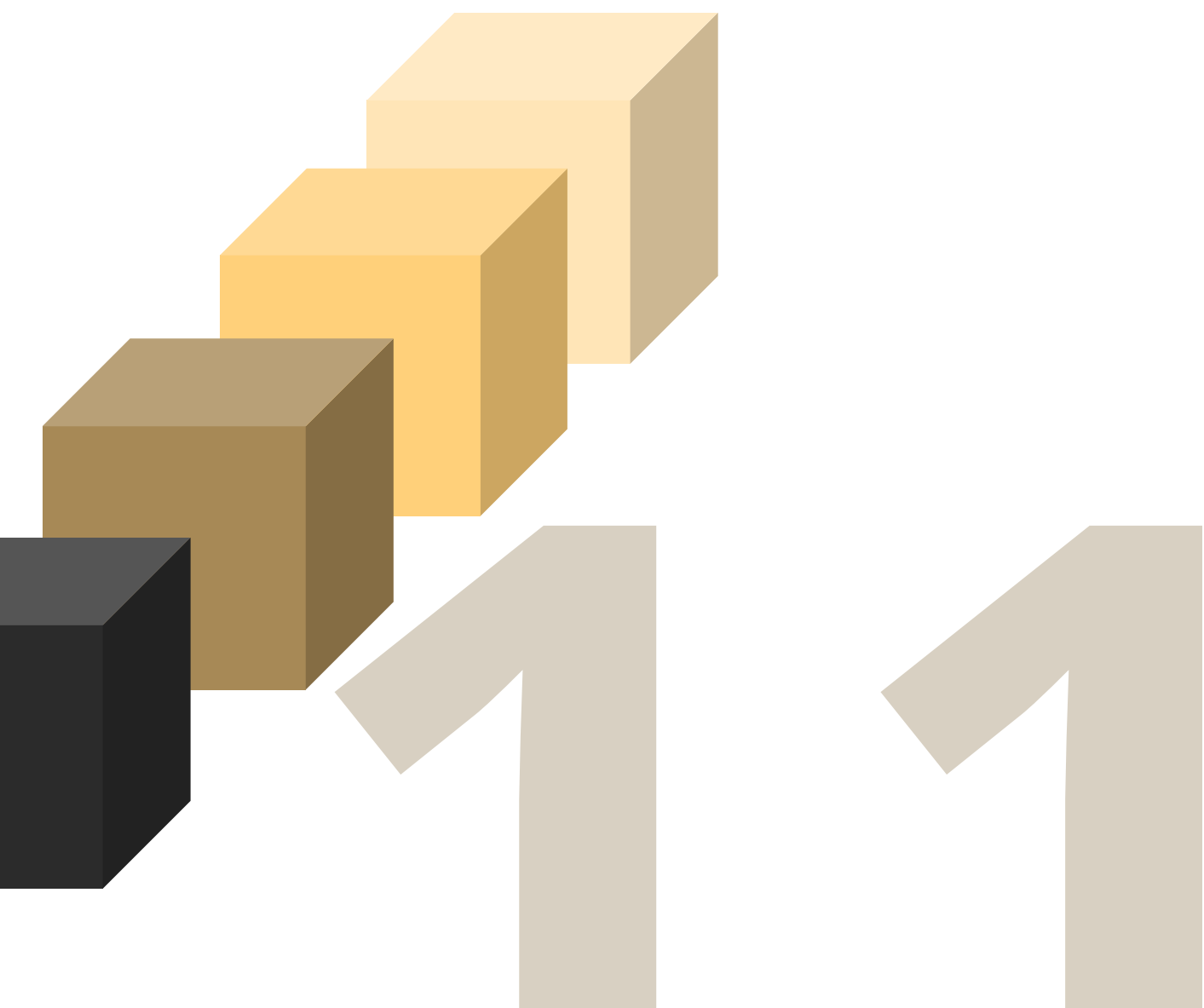
Blockchain technology can be used to verify the authenticity of products, documents, and digital assets by creating a tamper-proof record of their origin and ownership. This can help reduce fraud and increase trust in digital transactions

## TRANSPARENCY

Blockchain technology provides a transparent platform for transactions that can be viewed and verified by all parties in the network. This can help increase transparency in industries such as fashion, textile, and design, where trust and transparency are critical.

## COMPLIANCE

Blockchain technology can help ensure compliance with regulations by creating a transparent and auditable record of transactions. This can help businesses meet regulatory requirements, reduce the risk of non-compliance, and increase trust between parties in the network



# DEMYSTIFYING BLOCKCHAIN TECHNOLOGY

## INTRODUCTION TO BLOCKCHAIN TECHNOLOGY

Blockchain technology has garnered attention for its potential to address challenges across industries. While first embraced by the financial sector, various industries have now explored the technology's capacity to solve existing problems. To grasp the unique properties of blockchain, let's look at the internet's limitations. The internet is great for sharing information, like pictures and articles, but it struggles when it comes to exchanging valuable digital assets. This is because it's hard to prevent copies of these digital assets from losing their value. For example, people still use physical documents in global trade, to prove who owns what.

Blockchain creates a special layer of trust on top of the internet. It allows us to transfer valuable things directly between people without needing someone else to help us. Imagine a big group of people working together, checking and approving each transaction.

### PRIVATE BLOCKCHAIN

**A private blockchain is like a private club where only trusted members can join and do business together. Only authorised people can be part of a private blockchain. They need special permission to join and do things on the blockchain.**

### PUBLIC BLOCKCHAIN

**A public blockchain is like a big public playground where anyone can come and play. It is a place where people from all over the world can interact and do business together.**

**You don't need anyone's permission to join a public blockchain.**

They make sure everything is correct and cannot be changed later. They even put a timestamp on each transaction to show when it happened. And since every transaction is connected to the previous one, we always know which one is real and valid.

In simpler terms, blockchain lets us exchange valuable things with trust and security. It's like a big team of people keeping track of everything and ensuring no one can cheat. This way, we don't need to rely on intermediaries like banks to guarantee transactions. Implementing a blockchain is not easy and requires careful preparation. The correct data and necessary components should be in place beforehand to ensure successful implementation and utilisation of blockchain technology.

The relevance of blockchain technology to the fashion, furniture and design industry lies in its ability to address critical challenges and transform the way the industry operates, as the industry is characterised by complex global supply chains, issues of counterfeit products, and the need for transparency and sustainability.



# BLOCKCHAIN IN THE FASHION, FURNITURE AND DESIGN INDUSTRY

## UNLOCKING FASHION'S DIGITAL RENAISSANCE: NFTS, BLOCKCHAIN, AND THE PHYGITAL REVOLUTION

Until recently, blockchain technology has significantly impacted the financial sector, government agencies, and the health sector. However, there are compelling indications that this technology holds great potential and new services in the fashion and design industry. The combination of blockchain and IoT enables the creation of digital twins, bridging the physical and digital realms and unlocking a wide range of previously unattainable services.

A prominent example is Non-Fungible Tokens (NFTs), which have sparked innovation in the European fashion and design industry. Fashion brands are leveraging NFTs to bridge the gap between physical and digital experiences, referred to as 'phygital'. By tokenising unique fashion creations as NFTs, brands can establish verifiable ownership, rarity, and authenticity in the digital realm. These NFTs serve as digital ownership certificates, enabling fashion enthusiasts to collect and trade virtual fashion items. This fusion of NFTs and blockchain technology empowers Nordic designers to explore new dimensions of creativity, offering limited edition or collectable digital fashion pieces that can be showcased and celebrated in virtual worlds and online marketplaces.

Dolce & Gabbana's Gold Dress NFT showcased the fusion of fashion and digital art and exemplified the transformative potential of NFTs in the fashion industry. This creation redefined ownership through blockchain technology, offering a unique virtual experience in what is known as the Metaverse. It exemplifies the transformative potential of NFTs, gaming "skins", and virtual fashion that will edge closer to the mainstream, with some brands expanding into the Metaverse, blurring the lines between physical luxury and digital ownership.



The Gold Glass Dress NFT designed by Dolce & Gabbana and constructed by UNXD, a digital marketplace. Credit: [UNXD and Dolce & Gabbana](#)



# NORDIC BLOCKCHAIN ALLIANCE

## 3 | BLOCKCHAIN USE CASES IN THE FASHION, FURNITURE, AND DESIGN INDUSTRY



Image from: SPOOR



# BLOCKCHAIN USE CASES IN THE FASHION, FURNITURE AND DESIGN INDUSTRY

Blockchain offers brands a range of benefits, including improved production, compliance with future legislation, and new revenue streams. By examining successful use cases from the Nordic countries, we can gain valuable insights into how this technology is being applied. The identified use cases in the fashion and design industry have been chosen based on literary articles, trade books and previously defined use cases in this [publication](#) from Blockchain Business. These should not be seen as mutually exclusive but can coexist and overlap in various ways.



# 15

# BLOCKCHAIN USE CASES IN FASHION, FURNITURE AND DESIGN



## INCREASED TRACEABILITY

With enhanced traceability, companies can promote transparency within the supply chain



## ENHANCED AUTHENTICITY

Companies can strengthen brand identity with digital ownership and proof of authenticity



## INCREASED CIRCULARITY

Through the utilisation of decentralised and open marketplaces, companies can actively contribute to strengthening the circular economy



## PURSUING NEW REVENUE STREAMS

By fostering greater consumer engagement, companies can pursue new revenue streams

- Oriented towards compliance with regulations and guidelines
- Oriented towards new revenue streams new market opportunities



Image from: Wehlers



# BLOCKCHAIN USE CASES IN FASHION, FURNITURE AND DESIGN

## INCREASED TRACEABILITY



Blockchain technology can be utilised to ensure transparency and validation of products, as well as trace the origins of textile and furniture articles, among others. Traceability is tracking all processes from raw material procurement to production, consumption, and disposal, clarifying when, where, and by whom the product was produced. This can help protect consumers from being misled or deceived. Additionally, it can enable consumers to gain insight into whether the products are produced and transported under ethical and environmentally friendly conditions. Furthermore, blockchain technology can assist companies in complying with regulations and guidelines, including upcoming requirements for digital product passports and legal obligations regarding sustainability reporting.

## ENHANCED AUTHENTICITY



Through digital ownership, including NFTs and transfer of ownership, companies in the Nordic fashion and design industry can establish trust and proof of authenticity of high-end luxury products. The Nordic has not yet had a significant presence of high-end luxury companies where such technologies are commonly utilised; the focus will not be on this use case. However, it is worth noting that in other regions, the use case of increased authenticity through digital ownership has gained prominence. An example includes Aura Luxury Blockchain Consortium, a shared private platform launched by companies including LVMH and Prada in spring 2021. It is important to recognise the potential, and by leveraging blockchain technology, Nordic brands have the opportunity to strengthen trust, enhance brand protection, and combat fraudulent activities.

## INCREASED CIRCULARITY



Blockchain technology can facilitate the implementation of circular economy initiatives. Smart contracts and decentralised marketplaces can enable efficient product lifecycle management, including rental, resale, and recycling. By creating a trusted and transparent environment for peer-to-peer transactions, blockchain empowers consumers to actively participate in the circular economy, extending the lifespan of products and minimising waste.

The Nordic fashion and design industry can leverage blockchain technology as a powerful tool to increase circularity, promote ethical practices, and mitigate environmental impact.

## PURSUING NEW REVENUE STREAMS



The Nordic fashion and design industry is known for its ability to blend traditional craftsmanship with innovative design seamlessly. In this context, phygital experiences hold the potential to engage consumers in new and exciting ways. By using blockchain technology, brands can enhance phygital experiences in the Metaverse, bridging the physical and digital realms. By embracing the phygital trend, Nordic brands can create immersive, personalised experiences that resonate with consumers. This innovative approach not only strengthens brand loyalty but also positions Nordic fashion, furniture and design companies at the forefront of industry trends, shaping the future of consumer engagement. Brands can unlock new revenue streams by offering exclusive digital collectables, limited edition NFTs, and personalised virtual experiences.

# CASE TRACING ONE THREAD AT A TIME



In the dynamic world of Nordic fashion, furniture and design, where sustainability and transparency have become paramount, companies are **taking the lead in implementing traceability pilots**. These companies recognise that every thread holds a story, and by tracing the journey of their products, they are weaving a tapestry of trust and accountability. In this one-pager, we highlight two examples of Nordic fashion and design companies, BESTSELLER and H&M, who have embraced traceability as a powerful tool for transforming the industry.

## BESTSELLER X TEXTILEGENESIS

Bestseller, a Danish fashion company renowned for its global presence and extensive brand portfolio, has set a shining example in the pursuit of increased traceability. By partnering with [TextileGenesis](#), an innovator in blockchain tracing solutions, [Bestseller has successfully traced over 22,500 styles](#) in their Viscose Traceability Project. This collaboration demonstrated the platform's ability to trace renewable fibres from source to final product, bringing much-needed transparency to Bestseller's value chain. Inspired by this success, Bestseller has embarked on an upscaled pilot, aiming to double the number of supply chain partners and trace one million styles through a fibre-based approach.



Image from: YarnsandFibers News Bureau

## H&M X TEXTILEGENESIS

H&M, the multinational clothing company based in Sweden, has taken a bold step forward in championing transparency and traceability. Collaborating with TextileGenesis, H&M has explored practical and scalable solutions to ensure transparent and traceable supply chains. Using AI and blockchain technology, H&M has [traced the entire journey of garments](#), capturing the processes and locations involved in their creation. With a commitment to increasing traceability, H&M has successfully traced over 200 million garments in their scaled pilots.

## MINIMUM X TEXTILE PIONEERS X BRANDTAG

[BrandTag, a blockchain-based solution, partnered with Minimum](#), a Danish fashion brand known for contemporary classics. In collaboration with Textile Pioneers, Minimum created a capsule collection using fibre-to-fibre recycling. The collection featured EcoTag from BrandTag, allowing consumers to verify the authenticity and access product data by scanning a QR code. This innovative approach fostered consumer engagement and reduced handling costs for reseller platforms.



# CASE DRIVING CONSUMER- FACING TRANSPARENCY



Consumer-facing transparency is becoming a pivotal concept in the Nordic fashion, furniture and design industry. Recognising transparency as a business driver, these companies embrace this ethos, despite an industry that traditionally lacks a culture of pellucidity. In this context, several Nordic companies have taken proactive steps to enhance transparency and establish themselves as pioneers in the field. This text highlights three inspiring cases by COS, Gina Tricot, Filippa K, Houdini, and Fjällräven.

## **COS X VECHAIN X MYSTORY DNV**

COS, a fashion brand under H&M, partnered with VeChain to leverage blockchain technology for enhanced supply chain and sustainability management. By tracking over 4,000 products, COS aims to ensure authenticity and sustainability, utilising VeChain's MyStory product on the VeChain public blockchain. The integration of QR or NFC tags further enhances customer experiences.

## **GINA TRICOT X PAPERTALE**

Gina Tricot, a Swedish retail chain, collaborated with PaperTale to push transparency boundaries. Through blockchain technology, they traced the impact of garments on people and the planet, achieving ecological, social, and economic transparency. NFC chips and verified information empowered consumers, successfully adopting transparency on a larger scale.



## **FILIPPA K, HOUDINI, AND FJÄLLRÄVEN X TRUSTRACE**

Filippa K, Houdini, and Fjällräven partnered with TrusTrace, a product traceability software provider. TrusTrace facilitated full supply chain traceability, standardised data capture, and communication of sustainability claims. With blockchain technology, these companies eliminated data gaps, ensured reliable information, and empowered customers to make responsible choices. TrusTrace's collaboration with industry players formed an ecosystem, sharing social and environmental impact data and standardising facility information.

Through partnerships with blockchain providers, these Nordic companies have embraced consumer-faced transparency as a business driver in the fashion industry, paving the way for industry-wide changes.

# CASE NO SECRETS IN THE SUPPLY CHAIN



In the pursuit of transparency and trust, brands that prioritise responsible practices are implementing strategies to disclose their entire supply chain. While blockchain technology is often associated with achieving transparency, as is the case with Roccamore x SPOOR, it's important to highlight that the remaining three cases on Holzweiler, Norwegian Fashion Hub, and Norwegian Rain are not blockchain-based but still demonstrate a commitment to greater transparency in the early stages of development.

## ROCCAMORE X SPOOR

Roccamore, a Danish brand, utilises blockchain technology to provide a complete "track and trace" history from Danish cows to their shoes. By scanning the QR code found in the shoe, customers embark on a journey of data, including specific information about the cattle's origin and welfare, responsible tanning processes at Scan-Hide, final assembly in Italy, and the shoes' arrival back in Denmark. This innovative use of blockchain technology offers transparency and tells a captivating story within Roccamore's digital space.

## HOLZWEILER X TRUSTRACE

Holzweiler collaborates with TrusTrace to develop a system for tracking supply chains and communicating the lifecycle of their designs. While not blockchain-based, this initiative allows Holzweiler to share the comprehensive journey of their products, from material origins to the clothes hanger. By providing transparency from the early stages of development, Holzweiler empowers customers with knowledge and reinforces their commitment to responsible practices.

## NORWEGIAN FASHION HUB X EY

EY Norway, in collaboration with the Norwegian Fashion Hub and Norwegian Rain and Livid Jeans, have conducted a study. This is to see how blockchain technology can help contribute to more sustainable and transparent clothing production.

The goal was to eventually calculate the emissions for the entire value chain of participating brands to ensure accurate information sharing; additional factors need to be addressed.

Sensor technology and certification actors can play a crucial role in measuring greenhouse gas emissions, workers' rights, and using environmentally harmful chemicals. This data empowers brands to make informed decisions when selecting suppliers and encourages them to drive improvements.



Image from Spoor and Roccamores first launch



# CASE ENHANCED AUTHENTICITY



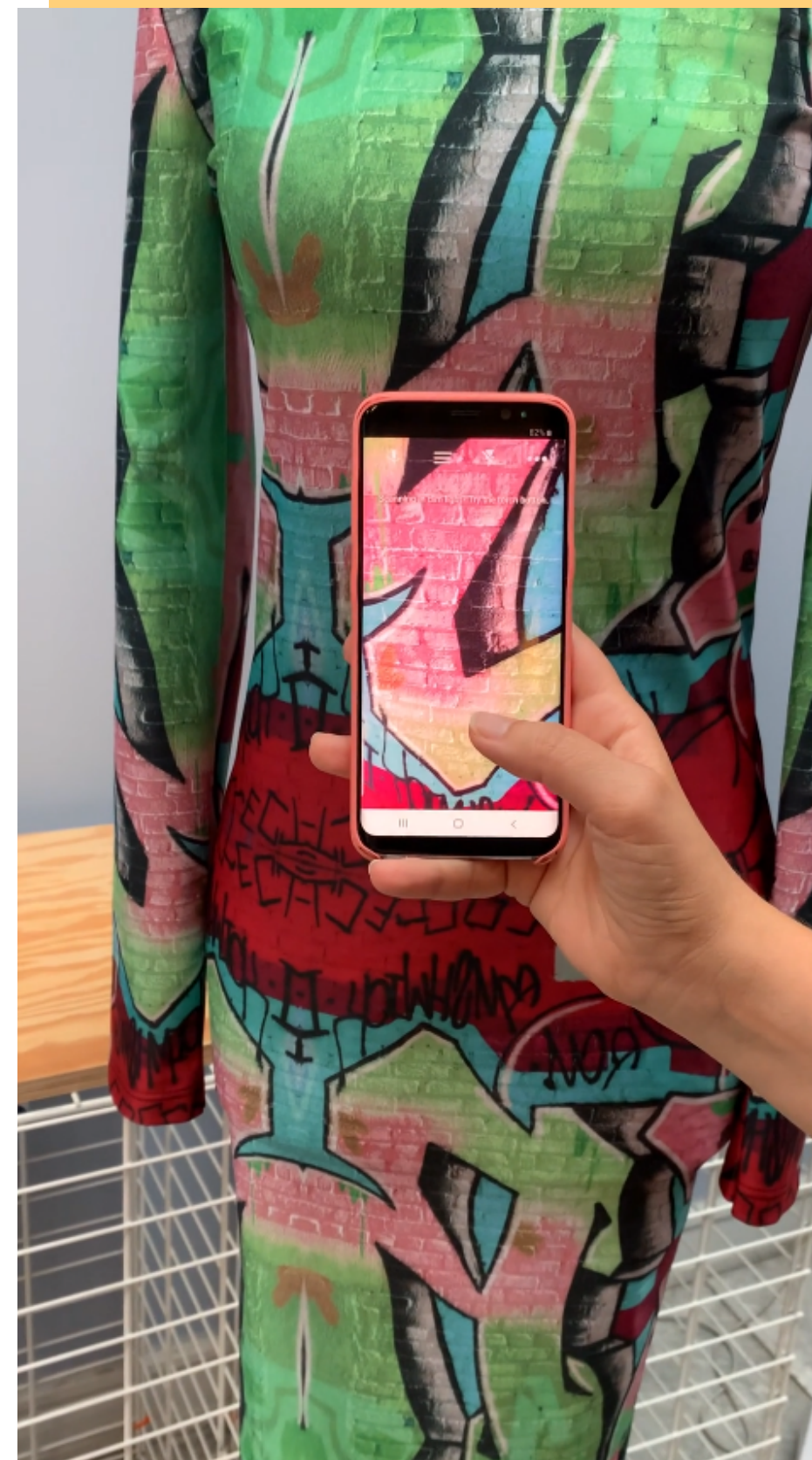
## TEKSTILSYMPIOSE HERNING X DIGIMARC

The "[Tekstilsymbiose Herning](#)" case study showcases Digimarc technology's ability to authenticate textiles without relying on care labels or brand logos. By utilising a camera scanner, this innovative approach rethinks traditional practices and opens up new possibilities for authenticity within the fashion and design industry.

The technology's embedded invisible watermark ensures seamless integration, providing reliable product information and streamlining processes. As part of the initiative, an intriguing example showcasing the capabilities of Digimarc technology involves the creation of a dress. This dress serves as a demonstration project, illustrating how the technology can be effectively implemented in the fashion and design industry. During the design phase, textile designer Gabriella Constantinou from Lifestyle & Design Cluster has chosen an expressive, colour-saturated design in three variants to showcase the invisible labelling.



Image from scanning UTG dress with Digimarc technology.



# CASE INCREASED CIRCULARITY



In today's world, achieving increased circularity has become a pressing industry need. This involves building partnerships that benefit all parties involved, ensuring transparency in material reuse, and leveraging blockchain technology to facilitate value for everyone. In this use case, we will explore three examples of blockchain used to drive **increased circularity and rethink traditional practices**.

## WEHLERS X CBS BLOCKCHAIN PILOT

Wehlers, a Danish furniture brand, emphasises quality, traceability, and circularity. Through a pilot project conducted with Copenhagen Business School, DI-andel, and Lifestyle & Design Cluster, Wehlers documented supply chain data on a blockchain using Hyperledger Fabric. Customers and partners can access this data by scanning a QR code on marketing materials. Additionally, Wehlers allows for the buyback and resale of their designs, with the blockchain ensuring proper compensation for the brand or designer involved.

## NCP NORDIC COMFORT PRODUCTS X EMPOWER.ECO

Empower. eco provides a digital platform that incentivises transparent and traceable collection, sourcing & recycling of plastic waste globally; it has partnered with the furniture provider NCP, Nordic Comfort Products, to tackle ocean plastic waste from the fishery industry into chairs using blockchain technology. Empower provides product passports and digital twins showing the origin and journey of materials, creating a disruptive level of trust and transparency between brands and consumers.

Image from: Empower.eco blockchain value chain





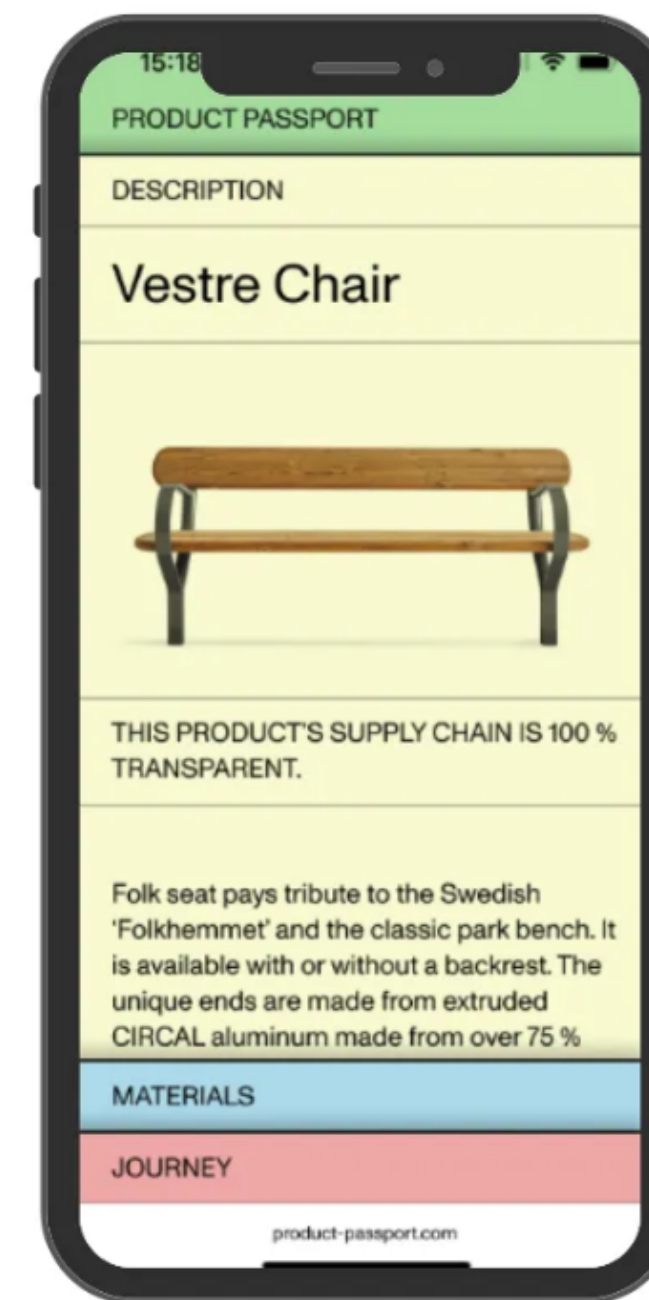
# CASE INCREASED CIRCULARITY



## VESTRE X EMPOWER.ECO

Vestre, a prominent Scandinavian urban furniture producer, has joined forces with the tech provider Empower.eco, to launch a Digital Product Passport (DPP), designed to increase transparency and advance circular practices. This partnership aligns with the upcoming EU legislation, Ecodesign for Sustainable Products Regulation (ESPR), which mandates Digital Product Passports for most products in the European market. By collaborating with Empower.eco and utilising blockchain technology, Vestre aims to become the world's most sustainable furniture company. The DPP enables users to track the product journey, promoting transparency and fostering positive change in the industry.

Image from: Empower.eco and vestre unveil new digital product passport pioneering circular-econom



Vestre Digital Product Passport verified by Empower.eco

# 23



# CASE PURSUING NEW REVENUE STREAMS



Industries have adapted from cardboard games to online gaming, physical concerts to live-streamed music, and physical books to digital formats. Now, the fashion, furniture, and design sectors are ready to embrace these changes. The **growing momentum of digital fashion** opens up new possibilities for innovative approaches. Similar to customers in physical stores, online users in the digital universe have diverse motivations, creating opportunities to sell more while producing less. This paves the way for leveraging technology to revolutionise these industries.

## SOULLAND X THE DEMATERILISED X LUKSO

Soulland, a Danish clothing brand founded in 2002, embraces sustainability and high-quality designs. In collaboration with Lifestyle & Design Cluster, they ventured into selling digital fashion. Soulland launched three NFTs (Non-fungible Tokens) during fashion week, showcasing the commercial potential of blockchain and NFTs in the fashion industry. The NFTs sold out within hours, demonstrating the interest in digital fashion as a practical solution to sustainability challenges.

## CARLINGS

Carlings, a Scandinavian retail brand, made waves in 2018 with the world's first digital clothing collection. Fans could upload their images to a microsite and have 3D-motion designers add virtual garments to their pictures. The collection sold out every day throughout its three-month run, indicating the growing acceptance and potential mainstream appeal of digital fashion.



Image from Vogue Scandinavia: Soulland reveals NFT



# CASE PURSUING NEW REVENUE STREAMS



Image from Play-to-earn games - launch of Rotate Theresa digital dress

## ROTATE X MOJOMOTO X THE DEMATERILISED

Rotate, a Danish fashion brand, launched the ROTAT3 Morph Phygital dress in 2022. Owners of this unique phygital dress received a made-to-order physical version along with an NFT holding a digitally rendered version of the dress. The NFT also granted access to digital collectables and a membership for a digital wardrobe refresh. Rotate successfully blurred the lines between the physical and digital worlds, engaging consumers in both realms.

## SIMONE FAURSCHOU X KNOWNORIGIN

Jewellery designer Simone Faurischou combined her fine jewellery-making skills with blockchain technology. She unveiled her new collection as a digital collection of NFT pieces, each NFT accompanied by a physical solid 18K gold block necklace. By bridging the gap between digital and physical, Simone Faurischou showcased the symbiosis of craftsmanship and modern design, attracting collectors from the digital art world.

These cases exemplify how the fashion, furniture, and design industries are exploring new revenue streams and embracing technology to meet the evolving demands of the digital universe.



Image from Simone Faurischou



# NORDIC BLOCKCHAIN ALLIANCE

## 4 | BLOCKCHAIN SOLUTIONS IN THE FASHION, FURNITURE, AND DESIGN INDUSTRY





# CHECKLIST – BEFORE CHOOSING A BLOCKCHAIN SOLUTION

Before diving into the world of blockchain technology, it is crucial to consider various factors to ensure the selection of the right blockchain solution for your business. This is a checklist of essential considerations to help you in this process, compiled from research.






Implementing a blockchain is like building a sturdy house brick by brick, requiring a solid foundation, careful planning, and meticulous preparation before construction begins. Before implementing a blockchain solution, ensure you have clear objectives, necessary expertise and resources, a compatible IT infrastructure, regulatory compliance understanding, collaboration opportunities, and budget considerations in place.

## 6 THINGS TO CONSIDER FOR YOUR OWN BUSINESS

- How many companies are already using the solution?
- What is the history of the blockchain solution?
- Is customization of the blockchain solution necessary?
- What are the costs of switching to an alternative solution?
- What are the implications of postponing a decision to adopt?
- In what direction is the solution evolving? And is our company headed the same way?

## 6 QUESTIONS FOR YOUR BLOCKCHAIN PROVIDER

- Is the blockchain solution built upon standards?
- What kind of standardization does the blockchain solution represent?
- How is the fit with other blockchains?
- What companies are involved in producing the blockchain solution?
- How many software companies can configure the blockchain solution?
- Is there an accessible knowledge base for the implementation and exploitation of the blockchain solution?

		BLOCKCHAIN PLATFORM	BLOCKCHAIN TYPE	PRICING MODEL*	SOLUTION
	Sweden	Hyperledger. Expanding to Ethereum	Consortium. Private	Subscription- based (monthly)	<u>TrusTrace</u>
	EU	Quadrans	Consortium. Public	Unknown (pilot project)	<u>TRICK</u>
	Sweden	Polygon	Public	Subscription- based.	<u>PaperTale</u>
	Norway	Empowerchain	Public	Subscription- based (monthly)	<u>Empower.eco</u>
	Denmark	Bitcoin	Public	Subscription- based (yearly)	<u>BrandTag</u>

\* The solutions are expected to have an implementation cost.



# ASSESS WHETHER A SOLUTION IS BLOCKCHAIN-BASED

The four steps below can help identify whether a solution is blockchain-based and which blockchain platform the solution is built on. Although not exhaustive, these steps can serve as indicators of whether a solution is blockchain-based.

Non-technical indicators

IS THE SOLUTION BRANDED ON BLOCKCHAIN?

1

Blockchain technology solution providers frequently promote the technology on their websites and social media platforms. Look out for keywords such as "Token," "Crypto," "decentralised," "Tamperproof," "NFT" (non-fungible Tokens), and "web3." If there is no mention of blockchain technology or any of these words on their communication channels, it strongly suggests that the solution is not based on blockchain.

DO OTHERS WRITE ABOUT THEIR BLOCKCHAIN?

2

Blockchain technology is still evolving, and solutions successfully based on blockchain and have pilot projects running generate significant news coverage. It is worthwhile to quickly search for press releases, articles, and reports that mention blockchain technology about the solution. If your search does not yield any results, it strongly indicates that the solution is not based on blockchain.

Technical indicators

IS THE SOLUTION AVAILABLE ON BLOCKCHAIN WEBSITES?

3

To determine the blockchain platform on which the solution is based, you can search for the solution on blockchain websites like [www.coinmarketcap.dk](http://www.coinmarketcap.dk). If the solution is listed there, it indicates that it is blockchain-based. If not, it could mean that the solution does not have its own token economy, which is common. If both steps 1 and 2 yield no results, likely, the solution is not blockchain-based.

IS APPLICATION PROGRAMMING INTERFACE (API) PUBLIC?

4

By now, you may have identified the blockchain platform on which the solution is based. In this case, it might be relevant to check if the API for this blockchain is publicly available, such as at [www.blockchain.com](http://www.blockchain.com). The availability of a public API for a blockchain is significant because it enables developers to interact with the blockchain and build applications on it.

# NORDIC BLOCKCHAIN ALLIANCE

## 5 | REFERENCES





# BLOCKCHAIN DICTIONARY

**Authenticity:** The assurance that a digital item or asset is genuine, original, and not counterfeit.

**Auditable record:** A record or log that can be checked and examined for accuracy and compliance.

**Blockchain:** A secure digital ledger that records transactions across multiple computers.

**Counterfeiting:** The act of making or distributing fake or imitation products.

**Digital certificates of ownership:** Verifiable digital documents that confirm someone's ownership of a specific item or asset.

**Digital twins:** Virtual replicas or representations of physical objects or systems used for analysis and simulation.

**Gaming "skins":** Customizable visual elements or modifications for characters or objects in video games.

**Immutable:** Data or information stored on a blockchain that cannot be changed or modified once recorded.

**Intermediaries:** Third-party entities or individuals that help with transactions or provide trust and verification services.

**IoT (Internet of Things):** A network of connected physical devices that exchange data and perform tasks.

**Metaverse:** A virtual or augmented reality space where users can interact with others and digital objects.

**Non-Fungible Tokens (NFTs):** Unique digital assets representing ownership or authenticity of digital items.

**Phygital:** The merging of physical and digital experience, service or product.

**Tamper-proof:** Data or information that is protected from unauthorised changes.

**Traceability:** The ability to track and follow the movement of goods or products along the supply chain.

**Transparency:** The visibility and accessibility of information or transactions to all relevant parties.

**Verifiable ownership:** The ability to prove or confirm digital asset ownership using cryptographic techniques.

**Virtual fashion items:** Digitally created fashion pieces that can be experienced, collected, and traded in virtual environments.

# Nordic research and knowledge institutions



Internet of Things and Blockchain Technology for Product related use - a Literature review  
By CBS, EQUIS, AACSB, AMBA, CEMS and PIM



Leveraging blockchain technology for sustainable fashion

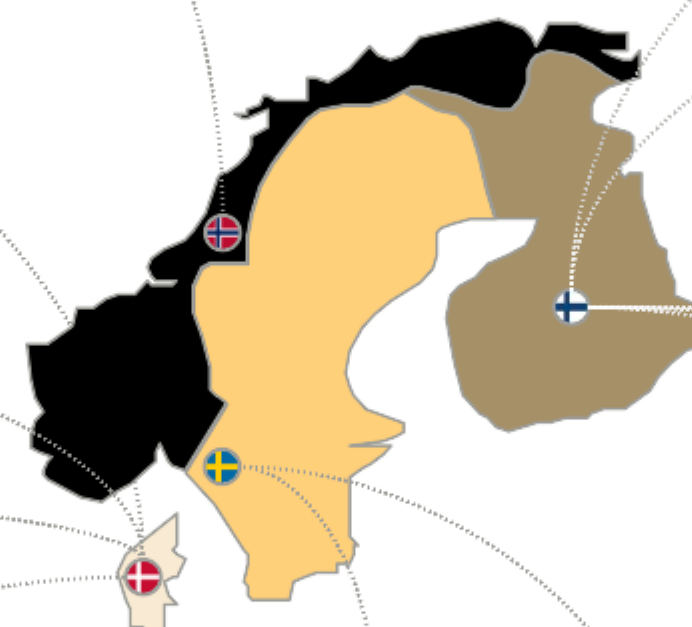
Feasibility study on behalf of Norwegian Fashion Hub, and its members Norwegian Rain AS and Livid Jeans AS.



Digital product passport promotes sustainable manufacturing  
By VTT Technical Research Centre of Finland



Digital Product Passport  
The report was commissioned by The Finnish Textile & Fashion and the Technology Industries of Finland



IT University of Copenhagen  
European Blockchain Center at ITU



Concordium Blockchain Research center Aarhus  
COBRA (au.dk)



Copenhagen Business School  
CBS - Department of Digitalization



Science Park Borås  
Science Park Borås - Transparency



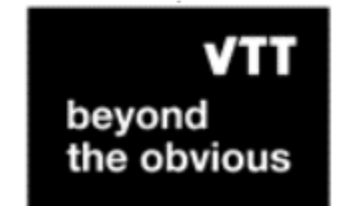
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