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Craft Revitalization Action
for Future-proofing the Transition
to Innovative Technologies
for Sustainable Development

D4.1 Playbook
CCSI for sustainability
Operational handbook for pilots and pilot ecosystems

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List of Acronyms

Abbreviation / acronym	Description
GA	Grant Agreement
CCSI	Cultural and Creative Sector and Industry
CDP	Customer Data Platform
CEAP	Circular Economy Action Plan
CLC	Colocation Centre (EIT Culture & Creativity)
CRM	Customer Relation Management
DMP	Data Management Platform
EC	European Commission
ESPR	Eco-design for Sustainable Products Regulation
EU	European Union
KPI	Key Performance Indicator
LCA	Life Cycle Assessment
OER	Open Education Resources
SBM	Sustainable Business Model
SME	Small and Medium size Enterprise
TBL	Tripple Bottom Line (People, Planet, Profit)
WP	Work Package

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Executive summary

D4.1, the operational handbook for the four CRAFT-IT4SD pilots, provides detailed descriptions of the activities and approaches planned for the pilots in Moldavia, Catalunya, Central Region Denmark and Northern Finland. The pilots are designed in an iterative manner and work with different foci and target groups in three periods of six months. In between the six months piloting, time is reserved for intrapilot collaboration and cross-pilot learning activities initiated and supported by WP6. Working for the key objective to contribute to the sustainable transformation of the fashion and textile industry by activating the innovation potential of the Cultural and Creative Sector and Industry, the pilots operate in the interplay between local crafts and living heritage, on the one side, and emerging digital technologies, on the other. The handbook includes sections on ethical guidelines for working with living heritage and craft, on impact pathways for sustainability, presenting the KPIs defined so far, the formats for documenting the pilot activities and our approach to pilot ecosystems as learning communities.

1. Introduction

1.1 Objectives of the handbook

This deliverable D4.1 is an operationalisation of CRAFT-IT4SD methodological foundation presented in D.2.1. It is specifically targeted at providing hands-on guidelines for the work in the four pilot sites, planned from 1 October 2024 for three periods of six months in an iterative manner. It describes the pilot ecosystems, their (post)industrial history, cultural heritage and craft, ethical consideration and impact pathways for sustainability, and outlines the activities planned in the three piloting phases and the cross-pilot activities between these phases.

1.2 Introduction to methods, principles, and approaches

Piloting in the CRAFT_IT4SD ecosystems in Northern Finland, Moldavia, Catalunya, and Central Jutland in Denmark involves exploring novel approaches and value propositions in the interplay between the revitalization of living heritage and craft on the one side and digital technologies on the other. This interplay aims to support the transition towards a more sustainable and slow approach to design, fashion, and textiles. To achieve this objective, our methodology and research approach are structured into three sequential stages of six months, where the pilots have different foci, target groups, and actors to engage with. Between each phase, time is reserved to reflect, analyse the results and learnings, and share and present them, supported by WP6, in a format that is accessible to all pilots.

Alongside the four foundational pillars already described in D2.1: 1) Ecosystem analysis for systematic experimentation; 2) Design Thinking process across connected ecosystems; 3) Life Cycle Assessment and collection of climate impact data; and 4) Explorative data validation, data sharing, and data-driven business modelling, in the pilots, we operate with four focus areas:

- Responsible and ethical approaches to cultural heritage and communities, especially in the interplay between living heritage, craft, and technologies
- Responsibility and reciprocity as foundations for generating impact
- Ecosystems as learning communities
- Green and responsible technologies for sustainability

2. Pilot descriptions
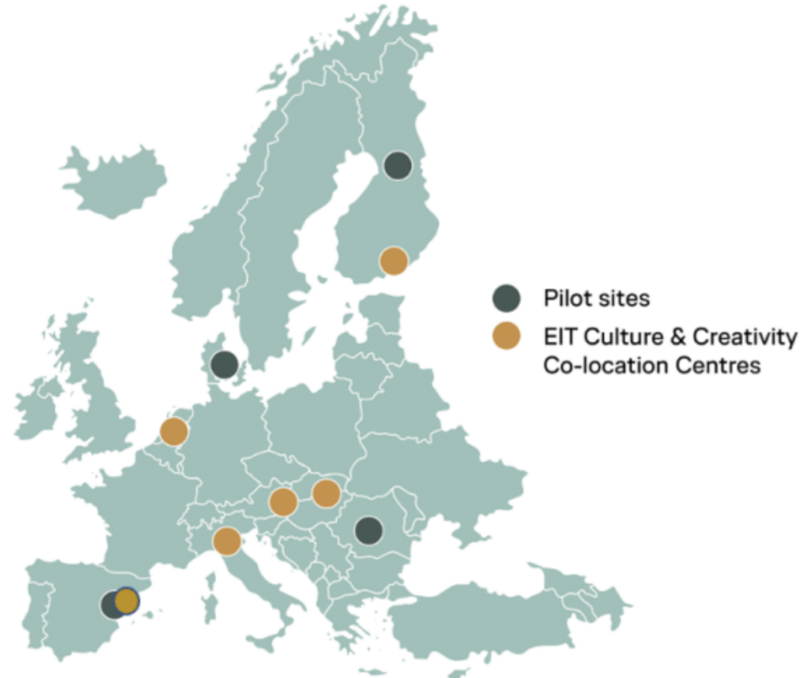
Figure 1 Pilot sites and ecosystems for replication connected to EIT CC Colocation centres

2.1 Pilot 1: Moldavia, Romania (TUIASI/REGINNOVA)

Title: Additive manufacturing and 3D printing for sustainable crafted capsule collections

Key focus areas: 3D printing, additive manufacturing, sustainability, crafts and heritage

The Pilot in North-east Romania is coordinated by TUIASI and co-led by REGINNOVA- a non-profit association actively developing a structured environment for innovation and development in Romanian's North-East Region's textile and clothing field.

Pilot Objectives
The Moldavia pilot in Romania will:

- develop skills and project-based training activities where innovation in crafts is tested and demonstrated through 3D printing technologies;
- create and develop capsule collections (by students from TUIASI and Arts University), combining traditional manufacturing with 3D printing, and present collections through fairs and fashion shows;
- develop regional technology transfer capacity for 3D Printing & Crafting to be implemented in regional enterprises;
- work with promotion, marketing, branding, advertising;
- work with community engagement.

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Moldavian ecosystem

The Moldavian ecosystem for traditional textiles is a vibrant, culturally rich landscape that reflects centuries of craftsmanship passed down through generations. Artisans and craftspeople are at the heart of this ecosystem, maintaining traditional techniques while adapting to modern trends.

The ecosystem in the Moldavian pilot includes clothing companies, the university, a cluster pilot in Romania, SMEs, high-end fashion brands (i.e. Musette and Irina Shrotter), the Astrico Cluster, operating in the textile clothing field focusing on innovative technologies and products, Iasi Municipality, through the county centre for the preservation and promotion of traditional culture, facilitating connections to and between artisans and craftspeople, and many others.

Despite its richness, the ecosystem faces challenges like declining interest amongst younger generations learning the craft, on the one side, and competition from mass-produced textiles, on the other. Preservation efforts by cultural organisations, government programmes, and NGOs aim to train new artisans and keep these skills alive. Workshops, cultural festivals, and educational programmes are pivotal in passing on the knowledge and techniques to ensure the craft endures.

The Moldavian textile ecosystem thrives on the delicate balance between tradition and adaptation, with artisans playing a vital role in keeping this cultural heritage vibrant and relevant in the modern world.

Sustainability

The pilot engages in activities in the Moldavian ecosystem for traditional textiles by emphasizing sustainability through a blend of restoration, recycling, and additive technologies.

Restoration Using Natural Materials: Traditional costumes crafted from natural fibres, such as wool, linen, and cotton, can be meticulously restored using organic dyes and fibres that match the original fabrics. This method preserves the garment's authenticity while promoting eco-friendly, biodegradable materials.

Digitisation for Cultural Conservation: Through 3D scanning and digital archiving, artisans can preserve the patterns, motifs, and structures of traditional garments without constant handling, which reduces wear and tear. These digital replicas ensure that designs are safeguarded for future generations and provide templates for creating new garments with minimal waste.

Recycling Textile Components: Components from older costumes that are too worn for restoration—such as embroidery, buttons, and trims—can be carefully removed and repurposed into new garments. This practice conserves valuable resources and ensures that cultural motifs and craftsmanship endure. These recycled elements can blend with new materials to create hybrid garments, merging tradition with modern techniques.

Upcycling: Damaged textiles can be creatively transformed into modern designs, home decor, or accessories, giving them new life. For instance, embroidered panels or woven fabrics from old costumes can be repurposed into bags, scarves, or contemporary fashion items, retaining their cultural essence.

3D Printing of Replacement Parts: Additive manufacturing allows for the precise 3D printing of delicate components of traditional costumes—such as jewellery, buckles, and buttons—using sustainable materials like biodegradable PLA. This approach minimizes the need for new raw materials while enabling highly accurate reproductions of traditional elements.

Custom Molds for Textile Production: 3D-printed moulds facilitate the production of accessories or embellishments used in costumes, allowing for small-batch, custom manufacturing with minimal waste.

These moulds can replicate traditional shapes and patterns, preserving cultural designs while utilising modern, eco-friendly materials.

Integrating Modern and Traditional Techniques: Additive technologies can also print fabric structures or lace-like designs that mimic the intricate detailing of traditional costumes, reducing the environmental impact of large-scale textile production. These lightweight, custom structures can be designed with recyclable filaments, minimizing waste associated with fabric offcuts.

By integrating traditional craftsmanship with recycling practices and modern additive manufacturing, Moldavian costume preservation can achieve sustainability goals—reducing waste, conserving resources, and promoting cultural continuity.

Digital technologies and data
Textile and Clothing are important sectors with a long tradition and are critical to the region's Smart Specialization Strategy. Given the expertise and the many companies active in the field, the industry could, with the implementation of digital technologies and innovative partnerships, undergo a revival and become a competitive player in the European market. Piloting in the North-East Region of Romania will demonstrate the viability and value of additive manufacturing technologies in fashion and design for sustainability by developing capsule collections to demonstrate the large potential of 3D printing on the traditional crafted fashion items in the real industrial environments of the manufacturing companies.

Apart from applying digital solutions to integrate modern design with inestimable cultural heritage through emerging technologies, the pilot will evaluate the potential for replication for other industrial crafts, such as home and interior textiles, furniture, and consumer goods.

Craftmanship, living heritage and local communities
Traditional crafts and occupations, still running in families and communities in the Romanian countryside, hold great potential for the fashion industry, such as weaving, leather crafting, wool spinning, milling, traditional clothing, and wall-carpet craftsmanship.

Moldavian textile artisans are renowned for their mastery of handwoven fabrics, embroidery, and intricate decorative patterns. Many work in small, family-run workshops, preserving ancient methods such as loom weaving and traditional needlework. They specialize in creating "Ia" (the traditional blouse), rugs, and woven carpets (known as "covoare") or traditional folk masks, each decorated with symbolic motifs and vibrant colours.

These artisans often use natural fibres like hemp, wool, cotton, and linen, which are spun and dyed using traditional methods. The dyes are derived from natural sources, such as plants, providing earthy and vibrant tones that characterize Moldavian textiles. This connection to nature is integral to the culture and identity of Moldavian craftsmanship.

The local communities play a critical role in sustaining this ecosystem. Textile craftsmanship is tied to important cultural and religious events, such as weddings and festivals, where handmade textiles are gifted or used in ceremonies. The motifs and patterns woven into fabrics often have symbolic meanings, representing nature, protection, and fertility. This makes each piece not only functional but also a form of storytelling and heritage preservation.

While traditional methods are at the core, there has been a growing collaboration between artisans and contemporary designers. This fusion helps keep the craft relevant in modern fashion and home decor. Local initiatives and craft fairs support artisans, promoting their work to local and international markets. Some

artisans have also embraced digital platforms, selling their handmade textiles online and increasing the visibility of Moldavian craftsmanship globally.

Legislation, regulations and governance
A key focus of the pilot is preparing companies for upcoming legislation, particularly in sustainability and circular economy practices, considering the new EU DPP regulations that will impact most companies in the coming years. The pilot also operates within existing legislative frameworks to safeguard traditional craft knowledge through intellectual property (IP) laws, ensuring that artisans retain ownership of their contributions.

Ethical considerations and codesign/cocreation
The pilot outcomes (collections, designs, events, reports, etc.) will respect authentic traditional knowledge and cultural practices and avoid assuming or misrepresenting recognised cultural elements. The project pilot will respect the ethical considerations and will ensure that any shared knowledge, symbols, or traditions are not exploited for commercial gain without proper authorisation and agreements that are beneficial for the artisans and communities.

Pilot activities planned

First phase

The first pilot iteration will focus on designing a capsule collection that will be highlighted at the regional level at DIMA Fashion Night 2024 and Romanian Creative Week 2025. The pilot will involve different participants from the Moldavian ecosystem, such as artisans and craftspeople, fashion designers, SMEs, high-end fashion brands and bachelor and master students.

The pilot will explore incorporating traditional materials such as hemp, cotton, and silk to create contemporary clothing designs that pay homage to the rich heritage of Romanian folk costumes. These designs will be enhanced by integrating various components produced through additive technologies, showcasing a seamless blend of tradition and innovation.

By focusing on these elements, the pilot aims to illustrate the vast potential of 3D printing in traditionally crafted fashion items. It will highlight the viability and inherent value of additive manufacturing technologies within the fashion and design industries, particularly in promoting sustainability. This initiative seeks to revitalize traditional craftsmanship and pave the way for innovative practices that honour cultural heritage while addressing modern sustainability challenges. Through collaborative efforts and creative exploration, the pilot aspires to set a precedent for the future of fashion that is both respectful of its roots and responsive to contemporary environmental needs.

Second phase

The second pilot iteration will build upon and enhance the insights gained during the first phase by integrating NFC tags into garments, allowing users to access various digital content seamlessly. This innovative feature will add a layer of interactivity, storytelling and engagement, enriching the overall consumer experience.

Artisans and craftspeople will showcase their expertise by producing traditional heritage elements, such as the "Ia" (the iconic traditional Romanian blouse) adorned with symbolic motifs and traditional toys and folk masks. These elements will reflect the culturally rich Romanian craftsmanship. Additionally, the artisans will collaborate with participants from the first iteration to incorporate additive technology

techniques into their work. This collaboration aims to highlight the immense potential of additive manufacturing in traditionally crafted fashion items.

Through this approach, the second pilot iteration will preserve and celebrate traditional crafts and demonstrate how modern technologies can enhance and transform these art forms. By merging the skills of artisans with innovative digital solutions, the pilot seeks to create a new narrative for traditional fashion that resonates with contemporary audiences while honouring its historical significance.

Third phase

The third pilot iteration will concentrate on developing a capsule collection that will gain prominence, both nationally and internationally. This initiative will engage a diverse range of participants from the Romanian ecosystem, including artisans and craftspeople, fashion designers, Small and Medium-sized Enterprises (SMEs), high-end fashion brands, and bachelor's and master's students.

Building on the activities within the Romanian ecosystem for traditional textiles, this pilot will emphasize sustainability through a comprehensive approach that incorporates recycling and additive technologies. By prioritizing sustainable practices, the pilot aims to showcase how traditional craftsmanship can adapt to modern demands while preserving cultural heritage.

In addition, the iteration will feature an interactive digital fashion show, leveraging advanced 3D design software and virtual reality (VR) tools to create digital garments. Digital avatars and fabric simulations will support this innovative showcase, allowing for an immersive experience that blurs the line between physical and virtual fashion.

Through these initiatives, the third pilot iteration seeks to highlight the potential of Romanian craftsmanship in a global context, fostering collaboration and creativity while addressing contemporary sustainability challenges. Integrating technology with traditional practices aims to redefine the future of fashion, making it more inclusive, interactive, and environmentally conscious.

Resources and facilities available and accessible by other pilot actors
The Additive Manufacturing (3D Printing) Lab includes 3D printers and CAD software for creating flexible, textile-related components. Materials used here include flexible filaments like TPU and biodegradable options like PLA. The Filament Production Lab focuses on producing textile filaments using extrusion machines, recycling systems, and material testing equipment, with inputs like polymer pellets and natural fibre composites.

The Digital Technologies for Textiles Lab leverages design software (Lectra, Gemini, Gerber) to produce innovative textile patterns. The Production Systems and Process Design Lab provides production line simulators, laser cutting machines, automated sewing tools for optimizing textile manufacturing and working with industrial-grade fabrics and consumables.

In the Digital Fashion Lab, 3D design software and VR tools enable the creation of digital garments and virtual fashion shows, supported by digital avatars and fabric simulations. The Technical and Functional Textiles Lab is equipped with testing machines to produce high-performance textiles.

The Footwear Design and Technology Lab focuses on designing and prototyping footwear and leather goods using CAD/CAM systems (Mind CAD, ICad3D+, Caligola), 3D printing for soles, and specialized equipment for cutting, stitching, and assembling footwear materials like leather, rubber, and textile fabrics. This setup covers all aspects of modern and traditional textile and footwear production.

For traditional textile processes, the Knitting and Weaving Labs feature computerised knitting machines and looms, supported by CAD software for designing complex knit and woven patterns. Finally, the Embroidery Lab uses automated machines and digitizing software to create decorative stitching with materials like silk threads and sequins. This setup balances traditional craftsmanship and modern technological advancements in textile production.

2.2 Pilot 2: Ostrobothnia, Finland (OAMK)

Title: Traditional Knowledge Meets Tomorrow's Wardrobe for Sustainability

Key focus areas: Traditional Crafts, Ecological values, New Materials, Co-design

The Pilot in Northern Finland will be coordinated by the Centre for Arts Innovation, Oulu University of Applied Sciences (OAMK).

The Oulu project has broadened its scope from clothing and garment production in a Sápmi context to a focus on traditional Northern Finnish crafting in general, as the original content of the pilot description was not sufficiently sensitive towards the Sápmi community and their values. In a Sápmi community, garments and clothing could be described as the opposite of fast fashion. The Sápmi community garment production is based on a value and belief system where individuals are embedded in a close family system of the Sámi craftsperson. Garment is only produced when a practical need for such an item arises, and an existing item cannot be mended. The item is expensive, takes time to make, is sustainable, and holds emotional value, but it is not manufactured to generate value outside the community context. Therefore, marrying business modelling, even with sustainability in mind, is counterintuitive to Sámi traditional culture.

This broader approach to the pilot might still include Sámi crafts but is not solely restricted to it. As Finland is in the leading group of European countries in which natural resources are over-used, it is critical to address this over-use in the project pilot by re-introducing traditional methods, materials and values which bring back nature-led and need-only based production of garments and clothing.

Pilot objectives
The Northern Finland pilot has as its main objectives:

- Design and implement a platform for traditional expertise and digital creative entrepreneurs to connect, share and co-design.
- Test approaches for digital practices and platforms connecting with traditional knowledge within the professional craft (handicraft SMEs) and craft education (vocational instructors for traditional craft and textile) sector.
- Develop garment prototypes and examples of sustainable production methods by merging traditional craft practices with emerging technology and new materials.
- To educate the CCSI and consumers to question the principal need of consumption and to invite all to evaluate the underlying value and belief systems of consumer culture and over-production
- Support traditional craft-based innovation methods, business models, and balanced interdisciplinary approaches, as well as articulate meaningful and ethical collaborations between SMEs and other organizations engaged in innovative uses for emerging technology and new materials.

The Northern Finland ecosystem

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The Pilot in Northern Finland is coordinated by the Centre for Arts Innovation, Oulu University of Applied Sciences (OAMK). A critical aspect of this pilot is the connection with the traditional craftsmanship, possibly including the Sámi Indigenous culture of the region. Traditional handicraft production involves a deep connection with the environmental ecosystems and a value system which respects natural resources and deviates from modern consumer thinking. The SMEs of traditional craft and textile producers will act as the core professional communities participating in the pilot. The city of Oulu will leverage its background as a city with a global tech industry focusing on mobile technologies. This way, the pilot will bring together expertise from Northern traditional craft professionals and professionals within the local emerging technologies industry, facilitated by the Centre for Arts Innovation. Oulu will be the European Capital of Culture 2026, with art and technology programming as one of the key themes, including projects on new textiles, traditional crafts and Sámi culture. Ultimately, the pilot will support meaningful co-creation driven by traditional craft practices for production and knowledge of natural materials, supporting traditional knowledge and livelihoods with appropriate innovation methods and materials. Thus, there is a strong focus on traditional crafts community-led engagement instead of industry-led, highlighting a naturally ecological approach to innovation in the sector.

For the Northern Finland pilot, the following CCSI players will support the project with know-how, which together will form the Northern Finnish ecosystem:

- The Northern Finnish crafts and textile artist community, including traditional craft artists and local fashion, textiles and design entrepreneurs, will be the core participants in the pilot.
- The Centre for Arts Innovation (CAI) will facilitate collaboration with regional technology companies in the fields of extended reality (XR), printed intelligence (OAMK PrinLab), immersive visualizations, and gaming, as well as connect with proposed projects (2023-2024) with the European Media and Immersive Lab (EMIL) in the field of XR and garment haptics innovation.
- VTT will support pilot connections with national-level industrial innovation projects and circular economy policies. This way, VTT will support pilot integration with Finnish projects on new materials and fashion innovation.

Sustainability and LCA
The Northern Finland pilot contributes significantly to sustainability objectives by integrating traditional craft practices with digital innovation, creating more sustainable business models and longer garment life cycles. Here's how the pilot's activities promote sustainability:

1. Environmental Sustainability & LCAs
The pilot merges traditional, low-energy craft techniques with new technologies and eco-friendly materials, reducing waste and resource use. The focus on garment prototypes encourages sustainable LCAs by using materials that have lower environmental impacts and promote circular economy principles such as durability, repairability, and recyclability. These innovations help minimize environmental impact throughout the product's life cycle, from sourcing to disposal.

The pilot also aims to educate consumers to question excessive consumption. This encourages a shift toward sustainable LCAs by reducing demand for mass-produced, short-lifespan products, which contributes to lower resource extraction, energy use, and waste in the production process.

2. Cultural and Social Sustainability
By integrating traditional craft techniques with modern tools, the pilot supports preserving culturally and environmentally sustainable practices, which often have smaller ecological footprints. When paired with

technology, these traditional methods enhance sustainability and ensure that heritage knowledge is respected and utilized in contemporary contexts. The platform connects traditional artisans with digital entrepreneurs, providing new economic opportunities for small and medium enterprises (SMEs) and supports fair collaborations. This ensures that these communities benefit from innovations and remain resilient, contributing to social and economic sustainability.

3. Sustainable Business Models & LCAs

The pilot supports the development of sustainable business models by combining traditional craftsmanship with technology, which allows for smaller-scale, resource-efficient production. These businesses will naturally improve the sustainability of their LCAs by adopting low-waste practices and ethical sourcing. In addition, digital platforms enable artisans to connect with broader markets, avoiding mass production and enabling on-demand, small-batch production. This reduces overproduction, improving LCAs by lowering overall waste and resource consumption.

4. Sustainable Education

Educating consumers to evaluate consumption patterns critically supports sustainable life cycles by encouraging longer product lifespans and promoting fewer, higher-quality purchases.

Digital Technologies and data

New technologies can be pivotal in the Northern Finland pilot by enhancing traditional craft practices and creating sustainable, innovative solutions. Digital platforms can connect traditional artisans with digital creative entrepreneurs, fostering collaboration, knowledge-sharing, and co-design. These platforms provide craftspeople access to broader markets and allow them to integrate new ideas into their work.

3D printing and other digital fabrication tools offer opportunities to create prototypes, customize designs, and reduce material waste. By merging traditional craft techniques with modern, efficient production methods, artisans can produce sustainable garments precisely.

Augmented reality (AR) and virtual design tools can assist artisans in visualising designs before production, enabling them to experiment with different materials and techniques without physical resources. This approach reduces waste and allows for greater creative freedom in combining traditional and modern aesthetics.

Blockchain technology can ensure transparency and ethical sourcing by tracking the origin of materials throughout the supply chain. This is particularly valuable for authenticating traditional crafts and providing consumers with detailed information about their products' environmental and social impact.

Sustainable material innovation, such as biodegradable textiles or recycled fibres, can be explored alongside traditional techniques to create eco-friendly products that align with modern consumer demands for sustainability.

Artificial intelligence (AI) can be used for design personalization and automation in the production process while still incorporating traditional craftsmanship. AI can analyse consumer preferences, enabling artisans to create bespoke items and reduce overproduction efficiently. These technologies modernize traditional craft practices, improve sustainability, and open new business opportunities for craft SMEs while preserving cultural heritage and craftsmanship.

Printed circuits can enhance the Northern Finland pilot by integrating smart technology into traditional crafts, creating wearable tech garments. These circuits enable clothing to monitor health, react to touch or light, or provide interactive features, merging craftsmanship with modern functionality.

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Printed circuits also support sustainable production, creating low-energy, lightweight electronics in garments. They can be designed for easy recycling, reducing e-waste and supporting a circular economy. By blending printed circuits with traditional craft, the pilot can open new opportunities in the fashion-tech sector, driving innovation and sustainability for SMEs.

Craftmanship, living heritage and local communities
The carrying principles behind the pilot are the values and ways of life underlining traditional crafts and textiles. As the project aims to bring the CCSI towards greener values and methods through a customer-driven approach, one way to achieve this is to deconstruct consumer culture and return to the roots. As clothes and textiles were traditionally made for one user, when and if they needed a new item and the old one could not be mended, this way of thinking and acting is one solution to over-production and over-consumption. However, changing thinking and behaviour is a long and arduous process. One aim of the Oamk pilot is to re-introduce a way of thinking and living that respects natural resources and is based on the actual and practical need for a new item of clothing. The pilot aims to bring forth nature's cycles and natural materials available during different seasons. The pilot will utilize technology to further distribute and demonstrate traditional craftsmanship and its methods, such as technology implemented into the garment or clothing, and to enhance the experience through AR, VR, and XR.

Legislation, regulations and governance
The Northern Finland pilot engages with various legislative and regulatory issues that impact traditional craft practices and digital innovation. These include preparing companies for future regulations, navigating existing laws, overcoming barriers to technology adoption, and managing governance challenges.

A key focus of the pilot is preparing companies for upcoming legislation, particularly in sustainability and circular economy practices. With new EU regulations, such as the Green Deal and the Digital Product Passport, set to reshape the garment and craft industries, the pilot helps SMEs adapt by promoting sustainable production methods and transparency. This ensures that companies are ready to comply with future regulations, including those requiring detailed tracking of materials and environmental impact through digital passports.

The pilot also works within existing legislative frameworks. It helps protect traditional craft knowledge through intellectual property (IP) laws, ensuring artisans retain ownership and are fairly compensated for their contributions. Additionally, it ensures compliance with labour laws regarding fair wages and working conditions product safety regulations, such as the EU's REACH regulation, which governs the use of new materials to ensure they meet safety standards.

Overcoming barriers to technology adoption and scaling is another challenge. The pilot must comply with data protection laws, like GDPR, ensuring that data shared on digital platforms is handled securely and with user consent. Emerging technologies, such as 3D printing or biomaterials, may face regulatory hurdles, so the pilot navigates these issues to facilitate the legal adoption of innovative methods. This also includes helping SMEs navigate complex export and trade laws, which can be obstacles when scaling up operations. Governance and ethical collaboration are crucial to the pilot's success. The platform must ensure fair participation through ethical governance, particularly for marginalized traditional artisans. It also manages the ethical use of traditional knowledge, ensuring it is respected and fairly utilized.

The pilot can also play a role in policy advocacy, showcasing how traditional knowledge and digital innovation can be integrated sustainably, potentially influencing future regulations. By pushing boundaries in new materials and technologies, the pilot may highlight areas where current regulations are inadequate,

encouraging regulatory innovation to support sustainable practices while protecting cultural and environmental values.

In summary, the Northern Finland pilot ensures compliance with current legislation and prepares participants for future legal frameworks. It addresses key regulatory challenges, supports ethical governance, and promotes responsible innovation in the craft and digital sectors, potentially shaping future sustainability and cultural protection legislation.

Ethical considerations

The ethical considerations for the Northern Finland pilot focus on preserving and respecting traditional knowledge while integrating it with digital innovation. It is crucial to ensure fair compensation and recognition for traditional artisans, avoiding the exploitation of their skills and cultural heritage. The pilot promotes equitable collaborations between small craft businesses and digital entrepreneurs, emphasizing mutual respect and ethical knowledge sharing. Additionally, it addresses environmental ethics by promoting sustainable production methods and responsible consumption, encouraging producers and consumers to critically assess their impact on resources and the environment. Lastly, the pilot fosters inclusivity, ensuring marginalised communities are fairly represented and benefit from new technologies.

Description of planned pilot activities

First phase

The first round of the pilot is executed by Oamk staff with textile design and craft skills and skills in new technologies, such as AR, XR, metaverse and gaming. The staff will co-create a pilot with a garment, and implement NFC tags in the garment, through which various content can be accessed. One kind of content could be an original song by Oamk music teaching staff. The garment will be a costume that is used in the Oamk dance teacher training production, and it will be tested in an actual performance/ artistic production. The costume can entail new technologies such as printed circuits and sensors, and the technology can be utilized as part of the performance. The performance or production will occur during the winter of 2024, and the pilot report will include the recorded performance. The budget for the pilot will be covered by project hours.

Second phase

The second pilot is done by Northern Finland based organizations and Oamk staff. The idea is to advance from the first pilot round to see which technologies can be added and used to create meaningful and value-adding content to the garment or costume. The second round will engage an artist from outside Oamk by asking for at least three bids from three artists or organisations with specific criteria. The Oamk project staff will first source suitable artists/ organisations, then meet with them to go over the project pilot requirements and to get to know their competencies and portfolios and then ask for bids to be delivered. The bids will have separate categories that will each be given points by a panel consisting of both Oamk project staff and outside crafts professionals. Once the panel has graded the bids, the bid with the highest score will be accepted. The budget for the second round of the pilot is 10 000€.

Third phase

The third pilot planned is a cross-pilot site collaboration with artists and companies from the pilot site countries. The idea is to create a pilot, so that co-creation, information exchange, learning, and co-operation

between the four pilot site countries can occur in practice. The experiences from the two first pilot rounds can be utilised in the final round. Craft traditions, new technologies and co-creation will remain the core of the pilot and technological resources from all four countries and pilot sites can be used. The practical process will proceed like the second pilot round. The Oamk staff will source and interview different artists and companies from the pilot sites and request a bid from at least three artists and companies for the pilot. The Oamk project staff will first source suitable artists/ organisations, then meet with them to go over the project pilot requirements, get to know their competencies and portfolios, and then ask for bids to be delivered. The bids will have separate categories, each given points by a pilot site project staff panel. Once the panel has graded the bids, the bid with the highest score will be accepted.
The budget for the second round of the pilot is 17 000€.

Resources and facilities available and offered
For the Northern Finland pilot, the following resources will support the project:

• The pilot will integrate with established programmes together with the Oulu 2026 Capital of Culture programme, e.g. the AVARA annual Art and Technology festival and the StartsLab experimental workspace (open in winter 2024), a 200m2 facility allowing for experimentation with emerging technologies (AI, data analytics, immersive projections, extended reality (XR), motion capture and new materials and printed technologies). Most recently, the CAI has been investing in infrastructure focusing on the merging of XR technology with haptics in garments specific to the performing arts field (e.g. theatre and dance), which in turn is a component of the Centre's work in articulating innovation methodologies in the CCSI (see Creative Europe project ACUTE 2022-2025).
• Ultimately, these infrastructures will be open to artists and cultural professionals in the pilots for use in the experimentation of new artistic and cultural production work in a broad spectrum of CCSI sectors. Additionally, this pilot will benefit from additional innovation infrastructures at OAMK, such as the Prinlab, Development Laboratory for Printed Intelligence. The Centre for Arts Innovation has extensive knowledge and experience with co-design facilitation, which will also be applied to the co-creation between the pilots.

2.3 Pilot 3 MODACC, Catalonia, Spain
Guiding the Adaptation of Micro companies and SMEs to the new legal, sustainable and digital framework in the textile and fashion sector

The Pilot in Catalonia, Spain, will be coordinated by MODACC (Catalan Fashion Cluster).

Key focus areas
Legal framework, eco-design for sustainable products regulation, environmental indicators, (Legal framework, Sustainable product legislation, cultural heritage, new technology integration)

Pilot objectives
The main objective of the pilot is to prepare SMEs for the upcoming sustainability legislation through the revival of pre-existing knowledge, crafts and cultural heritage, combined with new digital technologies, leading to new business models for sustainability.

The pilot will:

- explore the barriers micro-companies and SMEs need to overcome and the new business models required to respond to the upcoming EU legislation supporting sustainability.
- create a roadmap for adapting the legislation and product requirements for companies.
- create methodologies and measures for SMEs to adapt legislation and product requirements.
- enhance SME's resilience through reskilling and upskilling.

The pilot ecosystem
The pilot ecosystem in Catalonia, Spain is coordinated by the Catalan Fashion Cluster, MODACC, and includes a diversity of actors that are directly related and affected by legislation and digital technologies. The main target groups of the coordinated actions are micro-companies and SMEs that engage in craftmanship and industrial heritage within their business propositions and/or product portfolio and are currently navigating the complex EU legislation. Craft and digital technologies will be used as instruments that can enhance the resilience of the target groups through the acquisition of new knowledge and specialization of pre-existing knowledge. As a Cluster, MODACC has a wide and nurtured ecosystem that will enrich and support the pilot by exchanging information, collaborating and creating a valuable network.

The ecosystem of the pilot is categorised into seven groups:

  i.   Micro-companies and SMEs: Companies that are currently part of MODACCs portfolio or are part of Clusters with which MODACC has a strong collaboration;
  ii.   Artisans: Artisans that are part of a craftmanship directory developed by MODACC and which most recently was updated in 2023;
  iii. Governance entities: Entities that are part of government agencies and have strong connections to the CCSI and have a deep understanding of the legislative changes;
  iv.   Technology suppliers: Companies that develop and/or facilitate the implementation of new technologies that respond to CCSI's needs related to sustainability and legislative changes;
  v.   Clusters: Other groups with strong and long-lasting connections with MODACC can collaborate in the project by bringing value through collaboration, knowledge exchange and innovation.
  vi.   Educational centres: Entities that can contribute through knowledge generation, impartation and diffusion, that have previous experience in working with artisans and SMEs.
  vii. Research and Development entities: Companies or entities with a trajectory in research and development related to CCSI can offer innovative solutions.

Sustainability
Sustainability has shifted from low priority to a value differentiator, a "must have" in today's corporate world, due to the incremental integration of sustainable requirements in current EU legislation and the increasing awareness among companies and consumers. The pilot in Catalonia aims to contribute to sustainability in five ways, all having a transversal understanding of sustainability as the building block of a viable future.

Sustainability and SDG's
Our pilot has the ambition to contribute to the implementation of the Sustainable Development Goals as directions and common ground for action. The project will contribute to 1) SDG 8 (Decent work and economic growth) by helping companies improve their performance in social, environmental and economic

sustainability; 2) SDG 9 (Industry, innovation and infrastructure) by promoting innovative technologies and connecting them with micro-companies and SMEs that will benefit from their implementation; 3) to SDG 12 (Responsible consumption and production) by exploring new sustainable business models that are aligned with the upcoming legislation and contribute to the sustainable transformation of the fashion industry and 4) to SDG 17 (Partnership for the goals), by bringing together actors from different areas, such as governance entities and companies, artisans and clusters, to create synergies and collaborations.

Sustainable knowledge
MODACC's pilot aims to extend the existing knowledge on sustainability in the ecosystem in ways that integrating the sustainable legal framework, using new digital sustainable technologies and exploring sustainable business models requires less effort and is aligned with the companies' strategy. To do so, MODACC will create resources and knowledge interaction spaces.

Sustainability and technology
The pilot will look for opportunities to develop and integrate technologies that will help reach higher sustainability standards, therefore promoting innovation and evolution.

Environmental, social and economic sustainability
The pilot recognizes the TBL (Triple Bottom Line) as an essential tool to address sustainability efforts and aims to set it at the core of the project by guiding every action towards a balance between these three factors.

Sustainability indicators
The use of indicators is relevant to measuring the environmental impact and/or social impact of the project. This would contribute to the robustness of the results and the replicability and comparability of the pilot. To do so, different indicators can be used, such as LCA to measure the environmental impact of certain products or SROI to measure the social impact of certain initiatives.

Digital technologies and data
Digital technologies are part of our daily ves and have become almost compulsory for companies wanting to scale their business and increase efficiency in their operations. They also play an important role in innovation and differentiated value creation. Lately, digital technologies have also focused on creating innovative solutions to contribute to what could be said to be the greatest challenge of our time: sustainability. Solutions vary from energy production to waste management, recycling, machinery efficiency, smarter materials, traceability technologies, and others. The offer is abundant, can support the sustainable transition of our economy, the protection of the planet and human society.

In the fashion industry, specifically, some of the digital technologies worth highlighting are: 3D printing and Virtual Reality, which can make a significant contribution to waste reduction in the first steps of the value chain; NFC tags and the digital product passport can improve traceability and transparency in every tier of the production stages; 3D modelling and AI can contribute to a reduction in production and a more efficient use of materials. Also, PLM (Product Lifecycle Management) can help reducing excess production and waste.

Following from the above, innovative digital technologies are an important pillar of MODACC's pilot, and they will be used to support the adaptation of micro-companies and SMEs to new legislation related to sustainability. The present pilot aims to explore the available technologies on a regional level to generate a

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technology directory, which can be accessed by other members of the ecosystem, and create a selection based on the previously identified necessities of the target group, as well as other selection criteria such as viability of implementation, availability and level of impact. The process will follow a funnel approach, which will allow to have more than one filter phase, enabling better results based on the specific pains of the micro companies and SMEs. We expect technologies to facilitate the transition of companies to the new legal framework by monitoring tools, accessibility to new business models or by enhancing the value of living heritage and craftmanship.

Craftmanship, living heritage and local communities
Craftmanship, living heritage and local communities have recently received increased recognition. With growing awareness about the current environmental and social state, artisanal and traditional practices have emerged as a response to the rapid rhythm of production and consumption. In Catalonia, specifically, craftsmanship and the value of local products are increasingly relevant for consumers and consequently for brands. Thus, if addressed correctly, the implementation of craftmanship and heritage could represent a strategic advantage for micro-companies and SMEs who are willing to collaborate and combine the traditional techniques with innovative technological solutions.

The Catalan Fashion Cluster pilot aims to gain a broader understanding of the history of craftmanship and industrial heritage of Catalonia, which will then allow us to investigate the current state of crafts, heritage and local communities in depth. Considering throughout the whole process the ethical implications mentioned below.

Legislation, regulations and governance
Sustainability and legislation are nowadays deeply intertwined, which has favoured the pace of adoption of specific sustainability measures within the fashion industry in the EU but has also set several barriers in the adoption of the new legal framework, especially for micro companies and SMEs. As an adaptation response to these barriers and to the new sustainability requirements, several digital technologies have emerged offering a variety of options for compliance and integration.
Currently, there are many legislative changes, and many regulations have not issued final statements on the requirements of each regulation, which makes it more difficult for micro-companies and SMEs to adapt. Frameworks like the European Circular economy action plan, the Strategy for Sustainable Circular Textiles, Eco-design for Sustainable Products Regulation, Corporate Sustainability Due Diligence Directive and the Waste Framework Directive are the ones that stand out within the regulatory frameworks that affect fashion companies.

The pilot in Catalonia will be addressing the issue of adaptation of micro companies and SMEs to the current legal framework by identifying the needs of the target group when it comes to understanding, designing and implementing necessary changes that will allow them to comply with legislation and integrate sustainability within their business strategy and operations. To do so, the pilot will address the legislation, regulations and governance by creating a roadmap of the upcoming legislative changes to map and schedule the important dates and milestones for the members of the ecosystem, prioritizing the most relevant legislation changes for the selected participants and developing adaptative strategies through living heritage and new technologies.

Ethical considerations
When working with traditional knowledge, cultural heritage and digital technologies, there are multiple ethical factors that are important for the protection of the participants' creative value, intellectual property

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rights and traditions. An important ethical consideration in our piloting activities is ensuring that resources, knowledge and learnings of the participants involved, receive recognition. Also, when combining new technologies with cultural heritage in the context of the sustainable transformation of the fashion industry, it is necessary to be explicit about the values involved in artisanal production that might be challenged with the adoption of technologies.

Another relevant ethical consideration when working with digital technologies is related to the implementation of Artificial Intelligence, as we still lack legislation that can avoid a negative impact on society. Also, a responsible strategy for data privacy for the data generated by the technologies applied, like the NFC tags for the digital passport, is needed. In addition, greenwashing can be a real risk that needs to be addressed.

Other ethical considerations include processing data collected during the project, such as requesting informed consent from the participants, if photographic or video material is required, and respecting the authorship of the knowledge generated in the creation of roadmaps, manuals or possible products and services.

Pilot activities plan

First phase

Legislation and Technology
The first phase of the pilot project aims to lay a foundation for collaboration between ecosystem agents that have points of synergy and can add value to each other by pre-implementing a technology solution that contributes to the adaptation to the legislation. To do so, the initial phase will consist of an assessment stage with 3 principal activities:

1. Identifying the target group of the project by developing selection criteria for the micro-companies and SMEs that would benefit from participating. Based on the selection of this target group, the ecosystem will be re-mapped to identify potential players in the areas described in the pilot ecosystem section above.
2. Identifying and prioritising the needs of the target group regarding sustainability. For this, three resources will be used: review of existing literature and results from relevant projects; conducting surveys and convening a focus group. The focus group will be representative for the various groups in MODACC's ecosystem and targeted at laying a foundation for collaboration through the joint identification of challenges and needs.
3. The outcome of the literature review, the surveys and focus group interviews, we will make a prioritisation of regulations to narrow down the scope of the project and maximize its impact.

Based on the assessment stage, we will proceed to the scouting stage of innovative digital technologies at a regional level to create a technology directory. The scouting process will include a selection process of the most suitable technologies by establishing selection criteria that adequately respond to the identified needs and priorities. After the creation of the directory, a fair will take place, which will convene the target group and provide the most suitable technologies to facilitate the transition for companies and SMEs to comply with sustainability legislation.

The expected output will be that companies collaborate with the selected technologies to make a pre-implementation. The expected outcome of the collaboration is to lay a solid foundation among ecosystem

actors, bringing awareness about how traditional and living heritage can contribute to sustainability and elucidating how technology can enhance the process of adaptation to the upcoming legislation.

Second phase

Legislation and Impact Measurement
The second phase of the pilot will address one specific normative and will use impact measurement tools such as carbon footprint, Life Cycle Assessment (LCA) or Social Return of Investment (SROI). The objective of the second pilot is to create a roadmap to facilitate the adaptation to a selected normative, by using innovative technologies and impact measurement solutions as supporting tools, while generating educational resources for the members of the ecosystem. The pilot will focus on the same target group as the first phase and use the assessment stage results to select a single normative based on selection criteria. MODACC will oversee the creation of educational resources and workshops to work on reskilling or upskilling with the target group members. Parallelly, a legislative roadmap will be created with a strategy to achieve compliance of the selected normative. The output of the second phase will be X number of workshops, a roadmap of the legislation panorama and a strategy to comply with a selected normative, supported by impact measurement tools.

Third phase

Legislation and Sustainable Business Models
Finally, during the third phase of the pilot, we aim to gain a deeper understanding of the current sustainable business models found in the ecosystem, the way they are perceived by ecosystem actors and how they relate to legislation. To do so, a focus group will take place with members of all the ecosystem categories mentioned above. Questions will be conducted to understand which sustainable business models are being used, which are predominant, and which have the biggest impact. A literature review will take place to analyse the results of other studies. After gathering this information, selection criteria will be developed to select the most impactful and viable sustainable business models for the fashion industry, and we will study, based on our technology directory how innovative technologies can enhance them. Results will be presented in an online publication on sustainable business models supported by technologies, and a guide for micro companies and SMEs for how to implement Sustainable Business Model successfully. We will involve other members of the CRAFT-IT4SD pilots so the online publication can be enriched and developed as a living document.

Facilities, knowledge and services offered
- MODACC has two offices. The first is located in the city of Barcelona, and it has access to meeting rooms where phases one and two of the pilot can be carried out. The second one in Igualada, located 60 km from Barcelona, with access to 2 classrooms, a technical facility with clothing manufacturing machinery and an auditorium. It also has connections within the ecosystem (MAV, ELISAVA and other clusters) that can provide spaces for these phases.
- As part of the knowledge generated, the MODACC pilot has the specific objective of creating a legislative roadmap that serves as an adaptation guide for companies in the ecosystem and is developed during the lifetime of the project as a living document following the changes that may arise in the legislation.

- MODACC can also facilitate contacts to key actors of the ecosystem that can trigger new collaboration and synergies, also across the CRAFT-IT4SD pilots.

- Access to innovative technologies is an important service within the pilot that will allow the generation of knowledge and adaptation to new legislative requirements from a new approach for microenterprises and SMEs.

2.4 Pilot 4 Central Region, Denmark (VIA)

Combining Craft with Digital Technologies for Sustainability in Garment Design and Consumer Approaches

Key focus areas
Prototyping, Experimentation, Sprints, Users/Consumers

Pilot objectives
The pilot's objective is to use craftmanship to push technology boundaries and experiment and prototype for sustainable development.

The pilot ecosystem
The ecosystem in the Central Region of Denmark includes a diversity of players: SMEs and startups, micro-sized and one-man companies. In the pilot, we focus on the latter, as micro-companies play a pivotal role in the ecosystem and the industry. Historically, VIA University College, the organisation that leads the pilot, was established as the industry's own school, which means that there are solid relations and collaborations between VIA Design & Business and the industry in the region.

In addition to the many textile companies, the pilot's ecosystem consists of local public authorities (Herning and Ikast-Brande municipalities, as well as the region), the National Association for Fashion & Textiles (DM&T), "Bæredygtig Herning" a regional co-workspace and catalyst committed to sustainable development, the national innovation cluster Lifestyle and Design, the Business Development Centre supporting SMEs, FAoD and DKoD (national organizations for professional designers, craftsmen and architects) and Danish consumer organization Tænk.

Sustainability and LCA
The pilot will promote a model for circular and sustainable design of garments to regional SMEs and micro companies by:

a. developing an entrepreneurial living-lab community, where sustainable innovation in circular garment design is tested and demonstrated, supported by textile construction, applied as print, dye, embroidery, weaving, knitting, and further supplemented by (virtual) 3D design, body scanning and virtual production.
b. investigating the consumer side to the green transition, addressing sentiments and (gender) identities, analysis of consumers' reception of new technologies, of slow and on demand fashion, repurposing and the right to repair. Wet and dry test of fibres and textiles, and user tests by eye motion and eye tracking.
c. involving students in prototyping, scenario building and developing novel products and processes.

Digital technologies and data

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The three pilots foreseen incorporate different types of technologies, which, from various perspectives and approaches, have the potential to enrich practices in craft and design and contribute to the green transition. NFC tags, which will be implemented as technology in the pilot's first phase, bear the potential for broadening the knowledge and understanding of craft and design practices through communication and storytelling from brand/company to users. Simultaneously, the NFC tags contribute to preparing SMEs for the digital passport (Eco-design directive) by testing potential digital infrastructures.

The second pilot focuses on materials, experiments, developments and use. The employed technologies represent digital as well as analogue tools. Practitioners experiment with different tools related to their craft field and explore the potential of new digital tools for material developments, including printing, knitting, weaving, embroidery, and manufacturing. The experiments enable practitioners to evaluate where and to which extend their specific craft can benefit and/or be challenged by new technologies.

The correspondence between product and the human body is at the core of our third pilot. Body scanning, development of avatars, digital idea generation and digital design and product development are all elements employed to explore products and processes with new approaches and from different angles.
At the same time, all three pilots use eye tracking technology to test the relevance and resonance of experiments and solutions for users.

All these new technologies are being tested to see if there are opportunities to maintain interest in craft or spark new interest in craft practices when working in the tension between heritage and future, physical and digital worlds, and tradition and innovation. Central to the pilots is the respect for the crafts which the participating companies bring, technology as an enabler with a critical stance, and the green transition as a condition.

Craftmanship, living heritage and local communities
The local anchoring. The area around Herning has a long tradition of textile production. Organized wool and textile production in Central Jutland can be traced back to the 17th century. The lord gave the tenant farmers wool and knitted stockings, mittens and other woollen clothing. Some of the finished knitted products were handed over as part of the farmers' taxes to the lord, who resold them. Around the year 1700, knitting hosiery had become the most important secondary occupation for the area's farmers. In the middle of the 18th century, 20,000 pairs of stockings were produced annually from the manor, Herningholm. The focus on textiles is still very present in the area now, with the biggest Danish companies located in respectively Brande (Bestseller) and Ikast (DK company). Alongside these big fast fashion companies, several SMEs work with different types of products and at different stages in the value chain from smaller production sites to design-driven companies offering a broad variety of products and employing different types of craft.

Legislation, regulations and governance
The pilot is aimed to prepare companies and future designers (students) to work within the frames of the coming ECO design directive, including Design (requirements, standards), Performance (requirements), Information (in relation to environmental requirements) and the Digital Passport (data carrier).
Even if the upcoming Eco-Design directive is aimed towards the larger companies in the beginning, it will have an enormous impact on smaller and micro-sized companies in the not-so-far future. Therefore, we find it timely to work with these companies to secure a smooth transition to the directive. In Denmark, these companies have a very low turn-over, which most likely will be a challenge to comply with the directive, and at the same time this size of companies plays a pivotal role in the development and green transition of the Danish textile industry.

Ethical considerations
The considerations of the Central Region Denmark's pilots are respecting the companies' individual craft, heritage, design and brand values and respecting the users' privacy and values when we invite them into the neuro-lab, observe them and visit their wardrobes. Respect is crucial, and following general rules and procedures for user involvement means we will ask for written consent. This will allow the participants to withdraw at any time from the project. When consent is needed from companies and/or users we will adjust the standard templates from VIA University College and comply with the guidelines provided.

As these pilots also include students, the students are following general rules and procedures for their involvement, meaning that we also here will ask for written consent

Working with the NFCs may create suggestions or solutions where further consent is necessary, which is a point of awareness. Also, considering the potential risks of working back and forth between the digital and physical world and the potential impact collected data may have on all participants; companies, users, and students. The datasets collected during the pilots will expectedly vary in nature and possibly also include photos and video recordings, which require specific content forms that will be included in when necessary.

Furthermore, the companies are urged to share knowledge and findings, and there are thus also considerations related to protecting the participants' intellectual properties, traditions and brand values. Consequently, the knowledge sharing between companies and researchers demands clear agreements upon how and what is shared.

Pilot activities plan
The three pilot phases are built over the same frame and organized as a process that allows the participants to Explore, Envision, Experiment and Evaluate

First phase Spring 2025
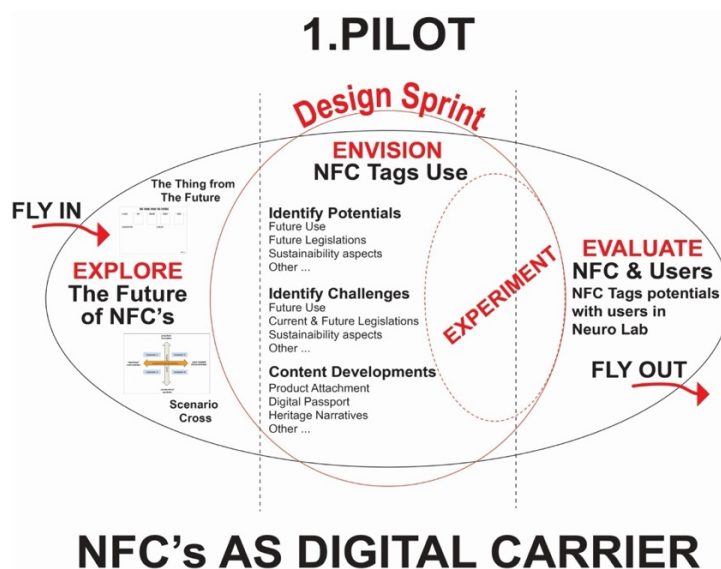
NFCs as DIGITAL CARRIER

Figure 2 Pilot phase 1 Herning

The first pilot is organised around a sprint exploring NFCs. Following the sprint, the companies are invited to work in the labs for a more extended period. The sprint is kickstarted with a Thing from the Future/Scenario Cross workshop and finalised with user tests in the Neurolab.

In the first pilot, there is a focus on several perspectives that can potentially contribute to the green transition. Working with NFCs as digital carriers through design sprints enables SMEs to explore, experiment, and test potentials and challenges. The design sprint contributes to paving the way for the SMEs' abilities to comply with future legislation (Eco-design), including digital passports and transparency.

In addition, the use of NFCs can help SMEs to create communities around their product, communicate their specific craftsmanship and/or heritage and thereby possibly create a framework that contributes to a greater respect for and attachment to their products. Elements that potentially prolong product life and reduce product replacements, thus contributing to a reduction in overproduction and overconsumption.

Participants:
4-8 companies will be recruited, and approximately 240 PBA students will be involved in the disciplinary module 'Explore the Industry'. The module, 'Explore the Industry', is scheduled for the 6th semester PBA and the participating Danish and International students represent eight different disciplines: Fashion design; pattern engineering; furniture design; visual design; purchasing; branding & marketing; retail; and entrepreneurship.
"Explore the Industry" consists of three subject elements: design; business and technology, over a period of 10 weeks and covers 15 ECTS. The students work with an individually formulated problem scenario, and the module ends with an individual exam, which includes a written report (all students), e.g., a process portfolio and products (depending on and related to their discipline). We will run a design sprint with the students, introducing them to NFCs. By the end of the course, we will invite the students who chose to work in-depth with the NFCs to the neurolab to perform user tests.

Second phase, Summer/Autumn 2025: **ANALOGUE and DIGITAL MATERIALS**
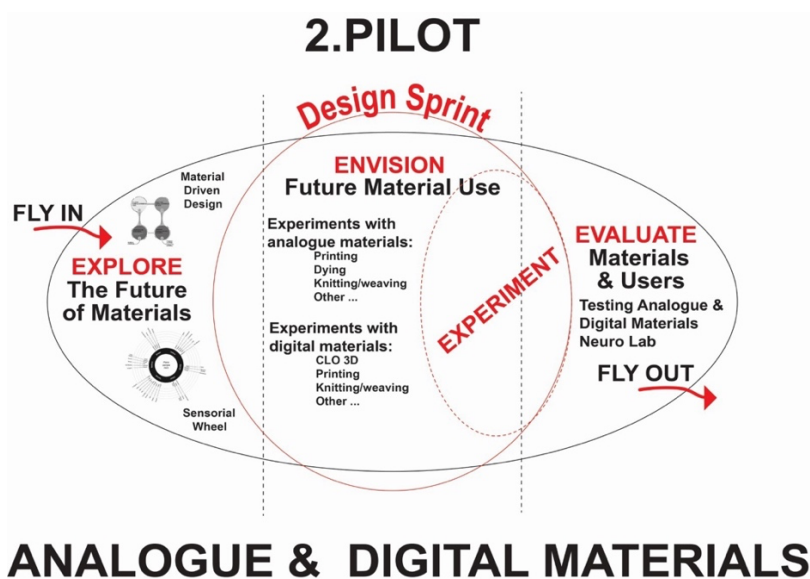

Figure 3 Pilot phase 2 Herning

The second workshop is organised around a sprint experimenting with materials using analogue and digital tools. Following the sprint, the companies are invited to work in the labs for a more extended period. The sprint is kickstarted with a Material-Driven Design/Sensorial Wheel workshop and finalised with user tests in the Neurolab.

The exploring phase is kicked-off with an introduction to Material Driven Design, MDD (Karana et al, 2015) and Material Driven Design for Apparel and Textiles, MDD4AT (Ready, 2024). The point of departure for both models is to explore new (alternative) materials critically to identify the unique qualities of the materials. Based on the insights and the inspiration, phase 2 is an envisioning phase in our labs (e.g. knit, print, weaving, embroidery, dyeing etc.) where experiments are carried out with the development of own materials and/or further development of existing materials. We work with both analogue and digital tools. In the last phase, material outcomes are tested with users to explore how they experience and evaluate new types of materials. This is done in our neuro lab with eye-tracking and interviews.

With resource scarcity and to contribute to the green transition, it is important to explore alternatives to virgin materials and traditional finishes. Be it biomaterials, recycled materials, regenerated materials, natural dying, printing, etc.

Participants:
4-8 companies (to be recruited), preferably the companies from the first phase
Up to 20 students participate in an elective. The elective is offered to the same group of students as in pilot phase 1, now in their 7th semester PBA and will probably particularly attract fashion, furniture, purchasing and entrepreneurship students. The elective lasts 3 weeks, corresponds to 5 ETCS and ends with an oral individual exam.

Furthermore, we will offer internships to students in their 6th and 3rd semester.
Firstly, two intern students in Spring 2025. This internship lasts 9 weeks, corresponds to 15 ECTS and is placed on PBA 6th semester. This is the same group of students as in pilot phase 1. During the internship each student works with an individual problem statement related to CRAFT-IT4SD, resulting in a final report and potential products, which are evaluated and graded. Students are recruited from all disciplines.

Secondly, two intern students in Autumn 2025. This internship lasts 9 weeks, corresponds to 15 ECTS and is placed on AP 3rd semester. During the internship, each student works with an individual problem statement related to CRAFT-IT4SD, resulting in a final report and potential products, which are evaluated and graded. Students are recruited from all disciplines – on the AP level, there are seven disciplines: Fashion design, pattern engineering, furniture design, visual design, purchasing, branding & marketing, and retail.

Third phase, Autumn/Winter 2025-2026: **BODY TYPES and PRODUCTS**
The third workshop is organized around a sprint exploring the diversity of bodies. Following the sprint, the companies are invited to work in the labs for a more extended period of time. The sprint is kickstarted with field studies in the form of observation and wardrobe studies and finalized with user tests in the Neurolab.
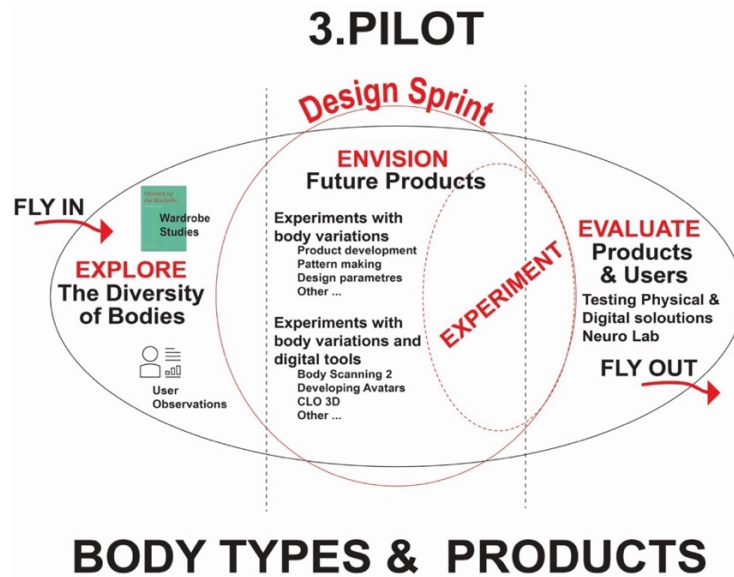
Figure 4 Pilot phase 3 Herning

The first phase starts with field surveys to learn about the company's users, including observations in stores and wardrobe studios. This step focuses on understanding real user preferences and challenges in the interaction with clothing as opposed to assumptions about users. The next step includes body scanning of core and potential users and the development of avatars. The avatars are used in 3D programs (e.g. CLO 3D) for idea and design development together with analogue and digital prototyping. The process moves back and forth between the digital and the physical world. Both physical and digital prototypes are subsequently tested with users in neuro-lab, including eye-tracking and interviews.

Participants:
4-8 companies will be recruited, preferably the companies from the first and second phase.
On the 5th PBA semester, the students from the eight disciplines work together in an interdisciplinary module. Approximately 240 PBA (Danish & international) students will work cross-disciplinary for 9 weeks and finalize with a week of group presentations and individual examinations; the module corresponds to 15 ETCS. (Relation to Craft-IT to be planned)

Facilities, knowledge and services offered
Digitized Craft and Materials labs with analogue and cutting-edge facilities. The digital tools are supplemented by traditional analogue tools, enabling a seamless transition from traditional craft to contemporary design. The facilities include workshops for knitting, weaving, embroidery, printing

3. Pilot ecosystems as learning communities

CRAFT-IT4SD is dedicated to advancing cross-sectoral Learning Ecosystems within the area of CCSI (Cultural and Creative Sector and Industries). It focuses on delivering a range of interactive Open Education Resources (OER), specifically designed for both up- and reskilling individuals across various sectors. These resources will undergo rigorous testing and implementation at designated pilot sites and will also serve as platforms for enhancing communication and collaboration among different pilot initiatives.

A collaborative virtual learning community will be developed during the entire duration of the project's implementation and its sustained impact afterward. This community will leverage insights and results from pilot programmes conducted in four distinct countries. The primary objective is to foster a comprehensive learning service that offers a wealth of interactive training content. Additionally, the project will introduce innovative training approaches organised into micro-credential-based curricula. This structured format ensures that learning is flexible and effective, promoting a creative blended learning environment catering to diverse learning preferences and needs. Through this initiative, participants can engage in meaningful learning experiences, enhancing their skills and competencies in an evolving job market. The learning environment will be created through a file repository linked to the CRAFT-IT4SD web, where a CANVA environment will interface with users and learners. The suite of Open Education Resources created during the project is planned for integration with sustained CCSI-learning platforms after the finalisation of CRAFT-IT4SD.

The learning communities focus on four dynamic areas within the pilots' ecosystems. First, they explore **Innovative Business Models** that drive creativity and adaptability in various sectors. Next, they develop a **Wardrobe for Sustainability**, promoting environmentally friendly fashion choices and practices. Third, they emphasize **Empowering Consumers**, equipping individuals with the knowledge and skills necessary to make informed choices. Finally, they delve into the intersection of **Crafts and Emerging Technologies**, fostering a synergy that enhances traditional techniques with modern advancements.
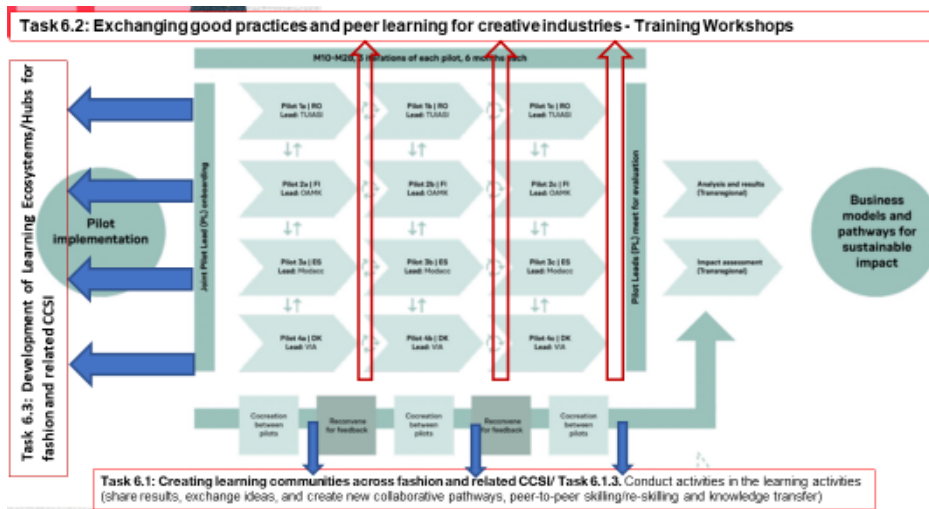

Figure 5 Ecosystems as Learning Communities

After each iteration of the four pilot actions, the consortium partners will conduct comprehensive training sessions designed to share **best practices** and encourage a vibrant atmosphere of **peer learning**. We anticipate broad participation and heightened interest, thanks to the targeted promotional campaigns each partner will implement nationally. These campaigns will aim to engage a diverse audience, ensuring stakeholders from various sectors are involved. Experts from all partner countries will play an integral role in these sessions, providing knowledge, insights, and concrete examples of effective practices. The events will be organized in a hybrid format, allowing in-person and virtual attendance, enhancing accessibility for all participants. Additionally, during these training sessions, the **curricula for the micro-credentials** will be rigorously tested and refined. These curricula will focus on the same four key topics as mentioned earlier, ensuring cohesion and relevance across all areas of learning.

The **Capacity Building Procedure** should be developed and validated to provide a comprehensive work program and clear guidelines for the teams involved in ongoing activities. This methodology will be tailored to each of the four **Learning Ecosystems**, ensuring a cohesive approach. For each Learning Ecosystem, we will create detailed **Action Plans** (APs) to foster excellence across several key areas: enhancing skills and opportunities for upskilling, optimizing teaching and learning resources, promoting synergies among members of the learning community, and strengthening cooperation with CCSI stakeholders. We must emphasize the interactive features of our resources, which include engaging training manuals, dynamic video lectures, and innovative learning-based games. These materials are specifically designed to captivate learners and enrich their educational experience, making the learning process more effective and enjoyable. This approach will significantly contribute to building the capacities of the Learning Ecosystems and Hubs.

4. Documentation of the pilot activities

The innovation and scaling potential of approaches, models, products, and solutions that emerge from the piloting activities will be carefully documented while they are in process with the help of a template. An online catalogue with a search function will be based on the template to ensure that the pilot activities are documented and showcased and that colleagues at other pilot sites can find inspiration and opportunities for collaboration. We found inspiration for the online catalogue that was developed in the Horizon 2020 project OrganiCity, led by Aarhus University.
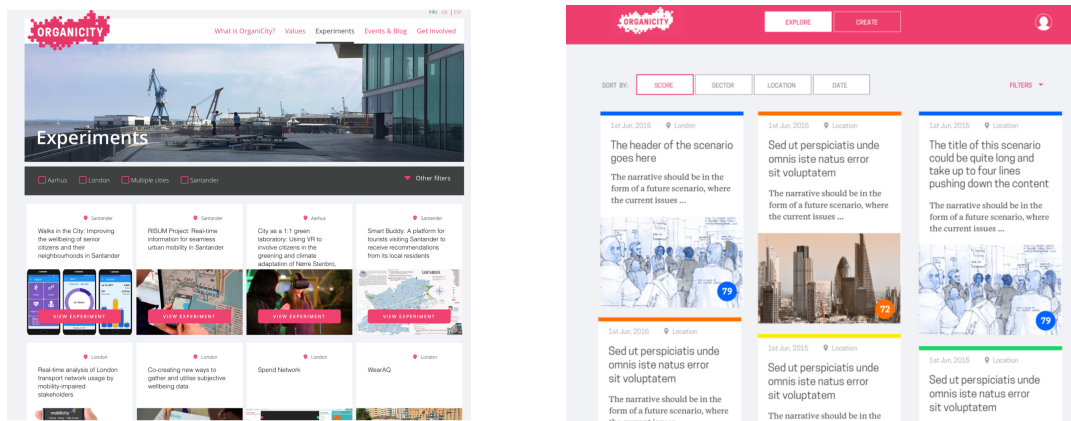

Figure 6 Examples for documenting and sharing pilot activities and cases

In addition, the open-source Scenariotool, also developed in the project OrganiCity is in the process of being adjusted and allows us to integrate ideas and novel solutions from a wider community and facilitate intrapilot collaboration through a voting function.

WP6 and WP7 will in collaboration, ensure that the results from the pilot activities are captured and shared in (online) learning communities through the website and existing channels and fora.

5. Ethical considerations

CRAFT-IT4SD approach to operate in the intersection between cultural heritage and craft on the one side and digital technologies on the other, with the objective to inspire to novel approaches and business models for sustainability requires a thorough ethical approach, where community values and local identities, connected to craft and living heritage are respected. As an overall framework, we follow the ethical

guidelines for SSH research published by the European Commission. More specifically, for the engagement with communities, including the indigenous Sámi in our Northern Finland pilot, but also the local communities with strong traditions in craft in Rumania, and the family companies and artisans in Catalunya and Herning we follow, where relevant, the Code of conduct of ethical research involving the Sámi people in Finland from 2024[1] and the Ethical guidelines from the American Anthropological Association (2012)[2], as well as the guidelines of the Associaton of Social Anthropologists in the UK, and the guidelines on ethnographical and anthropological research written by an expert group for the European Commission in 2021[3].

The guidelines for SSH research emerge from the basic principle that researchers have an over-riding obligation to protect participants' welfare and safety and to ensure they are treated fairly and with respect. The guidelines are framed by the following declarations and conventions:

- Charter of Fundamental Rights of the European Union
- European Convention on Human Rights (ECHR) and its Protocols
- UN Declaration of Human Rights
- UN Convention on the Rights of Persons with Disabilities (UN CRPD)
- Nuremberg Code
- Helsinki Declaration
- Belmont Report.

These conventions and declarations rely on nine principles that we will follow in our engagement with individuals, communities and (micro)companies in the pilot ecosystems:

1. respecting human dignity and integrity
2. ensuring honesty and transparency towards research subjects
3. respecting individual autonomy and obtaining free and informed consent (as well as permission whenever relevant)
4. protecting vulnerable individuals
5. ensuring privacy and confidentiality
6. promoting justice and inclusiveness
7. minimising harm and maximising benefit
8. sharing the benefits with disadvantaged populations, especially if the research is being carried out in developing countries
9. respecting and protecting the environment and future generations.

The challenge with many ethical guidelines is that they target individuals, rather than communities. Living heritage and craft are collectively produced, shared, and entangled with local identities and communities. Thus, responsible conduct for research on craft and cultural heritage should have a community orientation, which is the reason that we follow the guidance of the Code of Conduct of ethical research involving the

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[1] https://oulurepo.oulu.fi/bitstream/handle/10024/50115/nbnfioulu-202405294076.pdf?sequence=1&isAllowed=y
[2] AAA statement on ethics https://americananthro.org/about/policies/statement-on-ethics/
[3] Research ethics in ethnography/anthropology, 2021. https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/research-ethics-in-ethnography-anthropology_he_en.pdf

Sámi people in Finland[4] to the extent that the guidelines also are relevant for our work with other local communities. The Northsámi term *oadjebasvuohta* refers to both an individual and a collective sense of trust and safety within the community.

The Code of conduct for the Sámi people is based on the following three principles:

1. Reciprocal Communication and Engagement

This principle implies that the researcher in an interactive manner:

- determines the level of individual and collective engagement needed for conducting the research and agrees on the objectives and methods of engagement.

- presents the main research objectives to the community and research partners to be involved in the research in non-academic terms and in their own language. In addition, the parties jointly discuss what type of knowledge is collected and how it is used, processed, and stored. The parties also agree on the potential reuse of the research material and data.

- assesses the significance and impacts of the planned research on society and communities.

- discusses questions related to research ethics relevant to the community and informs the research participants of their rights (including their right not to participate or to withdraw from the research at any time during the process without negative consequences).

- provides the community members adequate time to familiarize themselves with the research objectives, methods and implementation and considers an appropriate timetable for conducting the research based on the research partners' or community availability.

2. Assessment of the Benefits and Risks of the Research and the Positionality of the Researcher and their Research

This principle implies situating oneself as a researcher and considering which research tradition the study belongs to and what impacts the study may have on the community involved. This includes:

- Considers whether the research questions, theoretical frameworks, and methods are suitable and appropriate from the community perspective.

- Assesses the potential harms and risks of the research from the local community perspective society and its possible impacts on the natural and cultural environments.

- Evaluates the characteristics and ownership of the knowledge used in the research. Local communities may possess knowledge that is not to be shared with others.

- Respects the intellectual property rights of the community about their traditional knowledge and cultural heritage. If the research results are to be used commercially or patented, this must be agreed with the community, and fair compensation must be secured.
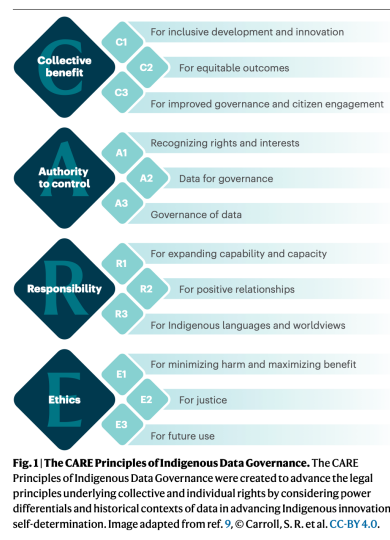
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[4] Ethical Guidelines for Research involving the Sámi People from Finland, 2024,
https://ourepo.oulu.fi/bitstream/handle/10024/50115/nbnfioulu-202405294076.pdf?sequence=1&isAllowed=y

3. Appreciation of and Respect for Sámi Society and Knowledge

This means acknowledging and recognizing local languages, knowledge, traditions, and rights. In addition, it is important to respect the Sámi land relations, social relations, livelihoods, traditional forms of governance and other institutions, and cultural protocols. In research, Sami partners should be treated as equal partners. This implies that the researcher:

- refrains from unnecessarily burdening Sámi communities by familiarizing them with existing research and archival material.

- ensures that the research is carried out with requisite cultural and social competence regarding the Sámi and determines the possible need to compensate the research partners for their expertise and time involved in the research.

- strives to ensure the right of the research partners and interviewees to participate in the research in their mother tongue.

- recognizes and respects the significance of traditional knowledge holders in the Sámi society when required by the research topic and respects their knowledge and ownership. All knowledge holders must be allowed to decide whether the information they share is anonymized.

- Ensures the research data and results are understandable and accessible to a non-specialist audience.

- Considers issues related to Indigenous peoples' ownership of their knowledge and observes the CARE Principles for Indigenous Data Governance[5].

- Implements national and European principles of processing sensitive personal data concerning ethnic groups

CARE Principles for Indigenous Data Governance

#BeFAIRandCARE

FAIR Guiding Principles for scientific data management and stewardship can be accessed here

Fig. 1 | The CARE Principles of Indigenous Data Governance. The CARE Principles of Indigenous Data Governance were created to advance the legal principles underlying collective and individual rights by considering power differentials and historical contexts of data in advancing Indigenous innovation self-determination. Image adapted from ref. 9, © Carroll, S. R. et al. CC-BY 4.0.

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[5] The CARE Principles for Indigenous Data Governance, 8 November 2018, Gaborone, Botswana. Global Indigenous Data Alliance, https://www.gida-global.org/care.

CRAFT IT 4 SD

Craft Revitalization Action
for Future-proofing the Transition
to Innovative Technologies
for Sustainable Development

The CARE Principles for Indigenous Data Governance were drafted during the International Data Week and Research Data Alliance Plenary co-hosted event "Indigenous Data Sovereignty Principles for the Governance of Indigenous Data Workshop," 8 November 2018. It was a response to movement toward open data and open science which does not fully engage with Indigenous Peoples rights and interests. Existing principles within the open data movement (e.g. FAIR: Findable, Accessible, Interoperable, Reusable) primarily focus on characteristics of data that will facilitate increased data sharing among entities while ignoring power differentials and historical contexts. The emphasis on greater data sharing alone creates tension for Indigenous Peoples, who also assert greater control over the application and use of Indigenous data and Indigenous Knowledge for collective benefit[6].

Informed Consent
The material, ideas and knowledge we collect, analyse and experiment with should be agreed upon on forehand, not only by the individual that shares, but in case of cultural heritage and collective knowledge and craft, consent might also be needed on a community level. When we ask a person or community to participate, we will communicate:

- the purpose(s) of the study and the anticipated consequences of the research;
- the identity of funders and sponsors;
- the anticipated uses of the data, also on the longer term;
- possible benefits of the study and harm or discomfort that might affect participants;
- issues relating to data storage and security;
- the degree of anonymity and confidentiality which may be afforded to informants and subjects and the possibility that unforeseen uses or theoretical interests may arise in the future that may need to be conveyed to participants, as should any likelihood that the data may be shared (in some form) with other colleagues or be made available to funders or other interested parties or deposited in archives.[7]

Informed consent will not only happen at the individual and community level but also apply, where relevant, to people present in public places and/or at large events.

Informed Consent should also be applied when filming and taking photos. If individual consent is not possible, we will avoid compromising people's identities or security in public presentations of the material through judicious editing. Consent is best requested at the time of the recording or filming.

Additional clarification and consent
When we interview people or communities or engage them through other participatory methods, we will clarify, before interviewing, the extent to which participants may see transcripts of interviews and notes to alter the content and withdraw statements.

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[6] Comment "Applying the Care Principles for Indigenous Data Governance" to ecology and biodiversity research. https://static1.squarespace.com/static/5d3799de845604000199cd24/t/65135f4af00a121ebfca69e2/1695768395731/s41559-023-02161-2.pdf
[7] Ethical Guidelines for Good Research Practice, Associtaion of Social Anthropologists, UK, https://www.theasa.org/ethics/guidelines.shtml

We will[8]:

- give participants a clear explanation of the aims, overall purpose, methods and implications of the research.
- explain that participation is voluntary.
- remind participants that they have a right to withdraw their consent without any consequences.
- explain the degree of benefit, risks, burden or discomfort involved in participation. Give an estimate of the time and effort expected of participants,
- explain precautions to ensure participants' safety and provide insurance information, if there is any.
- explain who is funding the research and for what purpose.
- disclose who will benefit from the research.
- give a firm commitment to protecting respondents' anonymity and privacy (provided that this can genuinely be guaranteed).
- make a clear commitment to treating personal and sensitive information confidentially.
- reassure participants that there are secure procedures for analysing any data gathered.
- explain clearly who will have access to any data that participants provide.
- consider any unintended/unexpected/incidental findings and explain how you intend to deal with such findings.
- explain briefly where research findings will be published.
- offer to provide respondents with further information about research if they ask for it.
- give the name and contact details of the contact person who can answer any queries participants may have.
- clarify possible uses for which data may be put in the future (if this is envisaged) and clarify whether participants will be asked for consent again if this is the case. Cover any issues relating to copyright of data and other materials used in the research.

Against the background of the declaration mentioned above and conventions, CRAFT-IT4SD guidelines can be summarised in the following:

1.Respect for Cultural Knowledge & Traditions

- Respectful dialogue to understand cultural contexts and local meanings and avoid misuse.
- Acknowledge origins, give proper credit and ensure fair compensation
- Obtain Free, Prior, and Informed Consent (FPIC) before engagement
- Communicate the possibility in the Informed Consent that resources and items can change meaning by being placed in new contexts.

2.Community involvement and co-creation

- Engage communities as active collaborative partners in decision-making and be aware of power hierarchies
- Seek consent also on a community level where needed
- Empower communities through fair compensation and skill-sharing
- Support knowledge transmission for future generations on the communities' own terms.

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[8] List based on the Informed Consent template from Erasmus University Rotterdam, https://www.eur.nl/onderzoek/research-services/onderzoekskwaliteit-en-integriteit/ethische-toetsing/informed-consent/checklist

3.Ethical use of (research) data
- Ensure data sovereignty – communities control their own data and knowledge.
- Respect privacy; not all heritage should necessarily be public.
- Use high-quality, authentic digital representation methods and get approval for using the technologies in advance

4.Sustainability and long-term impact
- Minimize the environmental impact of both craft and technology and travelling.
- Encourage sustainable material use and eco-friendly practices.
- Foster long-term collaboration and community empowerment and benefits.

6. Impact Pathways and KPIs

The long-term expected impact of CRAFT-IT4SD is a sustainable climate transition of society supported and driven by the CCSI sectors, which aligns with the European Green Deal, the EU legal actions and regulations for the CCSI, and the Fashion and Textile sectors. This is by the Horizon Europe Strategic Plan:

"The full potential of cultural heritage, arts, and cultural and creative sectors as a driver of sustainable innovation and a European sense of belonging is realised through a continuous engagement with society, citizens and economic sectors as well as through better protection, restoration, and promotion of cultural Heritage."

CRAFT-IT4SD has identified three main expected pathways to short-, medium- and long-term impact: 1) Enhanced and updated understanding of CCSIs in sustainable climate transition, 2) Research and knowledge-based approach(es) to CCSIs in driving a sustainable climate transition, and 3) Contributions to support CCSIs in climate transition in line with the 2030 goals. The pathways for impact link to specific UN Sustainable Development Goals, with the recommendation of adding SDG 8 (Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all) regarding the value chains, up- and downstream, for fashion and textile, and SDG 17 (Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development) with reference to the multi-helix ecosystems of the 4 CRAFT-IT4SD-pilot ecosystems. For each SDG 1-2 sub-targets will be selected to lever sustainability measures identified amongst other LCAs performed across CRAFT-IT4SD's pilots.

The impact pathways are significant for delivering on the implementation of CRAFT-IT4SD approaches and measures in and across the four pilot sites and for sharing results in the CRAFT-IT4SD learning communities and with policy makers. KPIs

The first pathway to impact, **Enhanced and updated understanding of CCSIs in sustainable climate transition** aims at securing the knowledge-based sustainable climate transition supporting CCSI ecosystems created via the 4 CRAFT-IT4SD-pilot sites. Scientific results will further new understandings of the CCSI as evolving and merging sectors enabled by the digital transformation, as well as the skills, capacities, and infrastructures needed to empower the CCSI to become a driver for the green transition. Economically and socially, the targets are to increase the understanding of CCSI business models in the context of sustainable climate transition by investigating business models' current state, future development, aspirations and alternatives, and business challenges and opportunities identified in relation to sustainable climate transition in and across the four pilot sites.

- Short-term impact is strengthening the regional sustainable climate transition through CCSI ecosystems and expanding sustainable climate transition beyond the CCSI sector and the regional level. One impact aim is public recognition of the value of the fashion and creative cultural ecosystems for the economy, society, and European heritage in advancing sustainable climate actions.
- Medium-term impact is to enhance the role of CCSIs in supporting the EU's sustainable climate transition.
- Long-term impact is a climate-neutral and digitalized CCSI sector with impact across sectors in driving the green transition.

UN Sustainable Development Goals targeted for the first impact pathway are
- Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
- Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable
- Goal 12: Ensure sustainable consumption and production patterns
- Goal 13. Take urgent action to combat climate change and its impacts

Target points and KPIs for the first impact pathway are
- Scientifically
  KPI: scientific publications and presentations
  Target: 9 publications and 15 presentations at conferences, publications and presentations are strategically planned for both scientific and policy impact

  KPI: Number of new projects
  Target: 2 projects are developed on the project's outcome

- Economically/Societal
  KPI: Actionable knowledge on climate impacts of CCSI
  Target: Climate-related hotspots identified in 4 pilot sites to create later concrete greenhouse gas emission reduction plans

  KPI: New business models created
  Target: 3 new sustainable climate transition supporting business models built and validated across the 4 pilot sites.

  KPI: New green skills related to digital technologies
  Target: Key skills, capacities and infrastructures identified in 4 pilot sites

  KPI: Number of collaborations established with larger and/or renowned fashion and textile industry actors interested in the project
  Target: 4 larger and/or renowned fashion and textile companies or industry organisations involved in pilot site activities

The second pathway to impact, **Research and knowledge-based approach(es) to CCSIs in driving a sustainable climate transition** aims at *securing practical tools and skills to drive sustainable climate transition in the pilots.* The pathway establishes research and knowledge-based approach(es) to CCSIs in driving a sustainable climate transition in the following ways by providing new knowledge of climate impact assessment in the context of CCSI and bringing enhanced understanding of how the CCSI, from a

cultural point of view relating to the role of heritage and craft, can act as drivers in the green transition. For micro and small companies, CRAFT-IT4SD will contribute with science-based knowledge to support sustainable business activities and product and service development. For the Fashion Industry, the project will secure information exchange and share project results with industrial actors in fashion, textile and technology. This pathway includes exchanges with projects funded under the same call as CRAFT-IT4SD and projects within textile and fashion research.

- Short-term impact is understanding how crafts, digital technologies and climate sustainability combine with garment design approaches, leading to value-added design products building on sustainable climate measures and enabling circular business models through the integration of digital tools and co-creation/co-design.
- Medium-term impact provides an enhanced understanding of CCSI potential in supporting EU's sustainable climate transition across ecosystems
- Long-term impact leads to a climate-neutral and digitalized CCSI sector with impact across other sectors in driving the green transition.

UN Sustainable Development Goals targeted for the second impact pathway are
- Goal 12: Ensure sustainable consumption and production patterns
- Goal 13. Take urgent action to combat climate change and its impacts

Target points and KPIs for the second impact pathway are

- Scientifically
  KPI: Scientific publication and presentations

  Target: 9 scientific publications and 15 presentations at conferences, publications and presentations are strategically planned for both scientific and policy impact

  KPI: Number of new projects
  Target: 2 new projects are developed

  KPI: Number of knowledge exchanges between other research projects
  Target: Collaboration with projects under the same call established and four joint meetings organised

- Economically/societal
  KPI: Number of new products and/or service ideas created during the project
  Target: 2 business concepts and four new products and/or service concepts in the pipeline

  KPI: Number of larger players interested in applying project results
  Target: 4 large fashion industry organisations and/or technology providers participated in project events

The third pathway to impact, **Contributions to support CCSIs in climate transition in line with the 2030 goals,** aims at identifying climate hotspots to enable making concrete GHG emission reduction plans in the pilot ecosystems. The pathway supports the CCSI in the climate transition by increasing the understanding of new business models for the green transition of the CCSI sectors and how such business models are applicable to other sites and ecosystems considering both climate, economic and social aspects. CRAFT-IT4SD will provide new knowledge of the economic aspects of the sustainable climate transition, enabling

business models developed in the project and best practices for upskilling and reskilling the workforce, exchanging best practices whilst bringing sustainable industries and CCSIs closer. CRAFT-IT4SD will enhance the understanding of new sustainable value creation models, products and services in the fashion industries as well as create and showcase initiatives for co-developing/co-designing products and services with the use of ICT and for a circular economy.

- Short-term impact secures future-proof, economically viable, climate-friendly business models for CCSI micro companies and SMEs in broader ecosystems. This will lead to an improved understanding and skills on green technologies and digital capabilities of business practitioners, designers and entrepreneurs operating in CCSI and related sectors, as well as new green job opportunities in the CCSI sectors combining manual and creative skills with novel digital technologies.
- Medium-term impact secures a sustainable climate transition supporting new business models in CCSI sectors.
- The long-term impact will lead to a climate-neutral and digitalized CCSI sector with an impact across other sectors in driving the green transition.

UN Sustainable Development Goals targeted for the first impact pathway are
- Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable
- Goal 13. Take urgent action to combat climate change and its impacts

Target points and KPIs for the third impact pathway are
- Scientifically
  Increased understanding of new business models to support sustainable climate transition in the CCSI sector and to enhance the understanding of the applicability of the business models to other sites and ecosystems considering both climate and economic aspects.

  KPI: Scientific publications and presentations
  Target: 9 scientific publications and 15 presentations at conferences, publications and presentations are strategically planned for both scientific and policy impact

  KPI Number of new projects
  Target: 2 projects are developed on this basis

- Economically/societal:
  New knowledge of the economic aspects of the sustainable climate transition will enable business models to be developed in the project, as well as best practices for up-and-reskilling the workforce, exchanging best practices whilst bringing sustainable industries and CCIs closer.

  KPI: Creation of new green jobs
  Target: > 4 new green jobs created in 4 pilot sites

  KPI: Participation in workshops to share best practices
  Target: 4 Pilot representatives have participated in 3 workshops to share best practices

  KPI: Number of collaborations between large organisations, CCSI actors, startups, micro companies, consumer organisations and consumer representatives

Target: 4 larger and/or renowned fashion and textile companies or industry organisations involved in pilot site activities, consumer participation in 2 pilot sites in co-developing/co-designing products and services

Impact pathways and KPIs were discussed at the first CRAFT-IT4SD Plenary Meeting, 17-18 Oct. 2024, and a number of recommendations were made. The main takeaways from this session at the Plenary Meeting are:

- The project impact pathways and expected outcomes address the project's contribution to the sustainable climate transition as part of the green transition.
- The sustainability impacts of CRAFT-IT4SD cover all the main dimensions of sustainable development (social and cultural, economic, and environmental)
  - The UN Sustainable Development Goals (SDGs) provide a framework for identifying the CRAFT-IT4SD impacts.
  - According to the Grant Agreement, the short, medium, and long-term impacts of CRAFT-IT4SD address the following SDGs: Goal 9, Industry, innovation, and infrastructure; Goal 11, Sustainable cities and communities; Goal 12, Responsible consumption and production; and Goal 13, Climate action.
  - It was discussed SDGs 8 (Decent work and economic growth) and 17 (Partnerships for the goals) should also be added.
- The project's KPIs were presented.
  - Many of the KPIs were considered relevant and clear.
  - Some KPIs need to be defined better. The KPIs concerning green job creation and the number of new business models especially need to be defined more precise.
  - It was also suggested that a more detailed look at sub-SDGs could be useful to better align the KPIs with them and fine-tune the CRAFT-IT KPIs when needed.
- KPIs will be reviewed more closely in the coming months, resulting in an updated list of KPIs at the end of the first pilot phase.

While sustainability measures are linked to the identification and enhancement of new business models in and across the pilots, measures for societal readiness also lead the work across pilot ecosystems, e.g., crafts communities, SMEs, and micro companies rooted in local identity and heritage. Societal Readiness Level (SRL) is a way of assessing the level of societal adaptation of, for instance, a particular social project, a technology, a product, a process, an intervention, or an innovation (whether social or technical) to be integrated into society. The below Societal Readiness Levels (according to the Danish Innovation Foundation)[9] will be guiding the CRAFT-IT4SD pilots and the follow-up replication phase across the EIT C&C Co-location Centers for social sustainability and innovation:

- SRL 1 – identifying the problem and identifying societal readiness
- SRL 2 – formulation of the problem, the proposed solution(s) and potential impact, expected societal readiness, identifying relevant stakeholders for the project.

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[9] https://innovationsfonden.dk/sites/default/files/2019-03/societal_readiness_levels_-_srl.pdf

- SRL 3 – initial testing of proposed solution(s) together with relevant stakeholders
- SRL 4 – problem validated through pilot testing in the relevant environment to substantiate proposed impact and societal readiness
- SRL 5 – proposed solution(s) validated, now by relevant stakeholders in the area
- SRL 6 – solution(s) demonstrated in a relevant environment and in cooperation with relevant stakeholders to gain initial feedback on the potential impact
- SRL 7 – the refinement of project and/or solution and, if needed, retesting in a relevant environment with relevant stakeholders
- SRL 8 – proposed solution(s) as well as a plan for societal adaptation complete and qualified
- SRL 9 – actual project solution(s) proven in relevant environment

7. Concluding Remarks

This operational handbook with detailed plans and descriptions of the four pilots and the intrapilot activities, include guidelines on ethical considerations for working with living heritage and crafts, embedded in community contexts, and digital technologies. The handbook has outlined the KPIs and impact pathways which will be adjusted and finetuned as the first pilot phase progresses. An updated table with KPIs, together with a process for validation and evaluation will be provided as part of D4.2, where the first results of the pilot activities will be presented.