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DIGITIZED & DIGITAL-NATIVE MEMORIES

Hyper-Sensing Creative Acts
The Role of Design in Transmitting Intangible Cultural Heritage through Digital Tools

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Abstract
Craft objects represent material culture, artisans' heterogeneous know-how shaped into tangible artefacts as results of *creative acts*, evidence of an "intimate connection between hand and head". Craftspeople are alive custodians of Intangible Cultural Heritage (ICH), conceived as embodied knowledge about practices, representations, living expressions, and skills inherited from the past and belonging to specific, situated communities. Due to sociocultural, economic, and technological barriers, the Fashion sector counts few attempts to preserve and transmit ICH to posterity.

Digital technologies could preserve, revive, transmit and valorize ICH's *creative acts* through their data, information, and knowledge encoding. Digital tools for data mining coupled with design ethnography could be powerful means to analyse, record, and archive analogue creative and productive processes. Through literature review, the paper aims to reflect on the relationship between craftsmanship, digital technologies, and ICH, firstly by identifying their applicative crafts sectors and secondly highlighting limits and opportunities of digital tools and procedures for crafts ICH representation (encode, document, analyse, preserve, and archive embodied knowledge) and presentation (translate data into engaging narratives toward ICH's dissemination and spreading). Resulting guidelines highlight the role of design toward sustainable development in preserving cultural diversity and identity against the fashion industry's mass production and growing globalisation.

1. Introduction

1.1. Intangible Cultural Heritage (ICH) of Craftsmanship's Creative Acts

Literature (Skublewska-Paszkowska et al., 2022) shows a sense of urgency and a new research focus directed at safeguarding and promoting tangible, intangible and mixed cultural heritage. Craft objects represent material culture, artisans' heterogeneous know-how shaped into tangible artefacts, the results of the *creative acts* (KWF Cologne, 2011), and the physical embodied evidence of an "intimate connection between hand and head" (Sennett, 2009, p.9). Intangible Cultural Heritage (ICH) refers to social and cultural practices and processes rooted in traditional and local cultures, including oral traditions, customs, language, music, and craftsmanship (UNESCO, 2003). Craftspeople are the alive custodians of ICH, conceived as practices, representations, living expressions, and skills inherited from the past and belonging to specific, situated communities (UNESCO, 2003).

ICH craft-related practices and creative acts are *embodied knowledge* often handed down through personal exchanges and oral mentoring between craftspeople and apprentices through a process of human knowledge transmission (UNESCO, 2003). The risk of disappearance of traditional crafts techniques, tacit knowledge, and embodied skills in creative acts is very high because it relies on the implicit practices of knowledge transfer of experienced craftspeople to novices through inductive and on-the-job learning. The small number of remaining experts, old in age and passing on their knowledge mainly in the familiar entourage and the limited number of educated young pro-

fessionals interested in artisanal jobs contribute to the risk of loss of cultural transmission of ICH in craftsmanship sectors. Craftsmanship's disappearance is increased by the impossibility of adapting to the competition of mass production at lower costs due to the delocalization of manufacturing to places where hand labour is low-priced. Therefore, even though artisans are valued for their talent, they find detrimental conditions to keep traditional craftsmanship alive in a technology-driven world. However, the promotion of the awareness of ICH helps maintain cultural diversity and preserve non-physical creative acts in the threat of globalisation.

1.2. Transmission of Fashion Craftsmanship ICH toward Cultural Sustainability

Fashion, luxury, and applied arts & crafts fields are CCIs as they are globally recognized for their excellence and competitive value in leveraging *creative acts* and producing cultural content embedded into practices and artefacts (Bertola et al., 2016; European Commission, 2016), thus entailing the preservation, safeguarding, and transmission of ICH. Indeed, the European cultural and technical know-how of craftsmanship in the fashion sector has a worldwide reputation. In particular, the EU textile and clothing sector employs 1.5 million people and produces a turnover of €162 billion, being clothing manufacturing the main contributor to the total production (Euratex, 2020), while the leather accessories and related goods sector comprises about 36K enterprises and generates a turnover of €48 billion, employing around 435K people. As the fashion craftsmanship sector is a significant asset for economic, cultural, social, and environmental sustainability,

entrepreneurship and education are essential topics for CCIs to preserve ICH (European Commission, 2019) and boost the economy. Safeguard attempts should focus on reviving the processes of the craft toward enhanced aesthetics and quality of creative processes and attracting the younger generation to artisanry processes. This can contribute to sustainable development in maintaining cultural diversity and identity against mass production and growing globalisation (Cominelli & Greffe, 2012), both encouraging old and new artisans' generations to produce craft, providing livelihoods to the crafts communities, and perpetuating creativity, thus impacting economics and social wellbeing.

1.3. Digital Technologies for Craftmanship's ICH Representation and Presentation

Digitization and digitalization have the ambition to be effective tools to safeguard ICH by representing (encoding, documenting, analysing, preserving) and presenting (transmitting, communicating, and disseminating) (Partarakis et al., 2020b) the tacit, intangible, embodied craftsmanship knowledge. Digital technologies can ensure the materialisation of ICH in digital memories using digital and augmented ethnographic approaches. Basic technologies aiding ethnographic research toward the digitization of ICH use audio recording, still photography, and video filming allowing the capture, recording, and storing of actions, activities, processes, contexts, environments, and atmospheres where craftsmanship takes place.
The use of digital tools for data mining (depth sensors and cameras, haptic devices, and sensorised wearables) combined with design ethnography could be a powerful means to ana-

lyse, record, and digitise analogue craft creative and productive processes, particularly regarding the "complexity of micro gestures used in crafting traditions" (Flanagan & Fraietta, 2019; Cheng et al., 2015), along with the creation of a deep and embodied knowledge (Frankjaer & Dalsgaard, 2018).

An *augmented* ethnographic approach (Churchill et al., 2010; Nicholas et al., 2022) could help digitise more data to extract more information about ICH and archive, present and preserve the intangible knowledge related to crafts' creative acts. These digital technologies are low-fidelity sensors (O'Sullivan & Igoe, 2004) used to monitor and analyse activities, behaviours, and the implicit bodily knowledge of craftspeople during their working activities or to capture the tools' perspective of routine processes (Churchill et al., 2005). More sophisticated sensors such as cameras, mobile eye-tracking devices, or head-worn augmented reality (AR) systems are used to capture body-mind implications while performing certain activities. In addition to this, the augmented computational and technological capabilities of 3D reconstruction and visualisation and augmented narrative through virtual, augmented, and mixed reality (VR, AR, MR) (Konstantakis & Caridakis, 2020) not only allow to document and encode practices but are also fundamental to guide the making practices for educational transmission and other dissemination scopes (Nicholas et al., 2022).

2. Methodology

The methodology of this study consists of a systematic literature review in the craftsmanship, design, socio-technical, and Human-Computer Interaction (HCI) disciplines. It has been developed through the following path:

- Development of the study aims and research questions definition.
- Development of the desk research query on academic publication databases and digital research engines.
- Definition of research criteria concerning databases and keywords.
- Selection of publications and case studies and application of inclusion/exclusion criteria.
- Data extraction and contents analysis.

2.1. Aim of the Study

The paper aims to reflect on the relationship between analogue craftsmanship, digital technologies, and ICH to discuss the role of design in:

- Applying digital technologies, tools, and procedures for crafts ICH representation: encode, document, analyze, preserve, and archive embodied knowledge about crafts' creative acts within traditional craft environments.
- Applying digital technologies, tools, and procedures for crafts ICH presentation: translate data into engaging narratives toward dissemination and spreading of ICH to the broader public.
- A particular focus on the use of digital technologies in ICH of fashion craftsmanship aims to understand the emerging opportunities and limitations for future research on the role of design in preserving and transmitting fashion craftsmanship embodied knowledge.

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2.2. Literature Review

The literature review was conducted between February 2022 and June 2022, using the primary academic publication databases (WoS, Scopus, Elsevier, Science Direct) and digital research engines (Google and Google Scholar) to reach both resources from the most prestigious academic databases, and case studies, publications, and grey literature on the topic. The structure of the first research query undertakes the following keywords: (*intangible cultural heritage* or *non-physical heritage*) and (*craftsmanship* or *crafts* or *artisanship*) and (*digital*). Subsequent research also included (*gesture* or *augmented ethnography*) to specify better the focus of the studies related to creative acts. Finally, specific research also included the terms (*fashion*, *textile,* or *clothing*) to address the studies related to fashion and apparel craftsmanship.

The selection and screening phase regarded the abstract analysis and the articles' conclusions to understand how much they fit the research. This screening identified 21 articles and papers and four projects as case studies (Fig. 1). Classification followed the criteria of (i) year of publication, craft sector, gestures tracked, focus area between presentation and representation, used technologies highlighting limitations, and opportunities. In addition, technological implementations have been qualitatively analised in the results section. Resources were included if focusing on craftsmanship ICH mediated by digital technologies published or released between 2012 and 2022 only.

The research has been conducted to identify:

- The main craftsmanship sectors involved in the representation and presentation of ICH creative acts using digital technologies.
- The technologies adopted, related outputs, opportunities, and limitations for representing ICH creative acts.
- The technologies adopted, related outputs, opportunities, and limitations for presenting ICH creative acts.

3. Results

3.1. Identified Craftsmanship Sectors
Literature review outcomes prove a growing interest in the representation and presentation of ICH in the context of crafts practices started in 2014 and peaked in 2019-2022 during what Fox Miller (2017) defined as the "third-wave craft movement".

Skublewska-Paszkowska et al. (2022) also demonstrated that craftsmanship ICH mediated by technologies is a growing research context. Indeed, the development of advanced digital tools has allowed reflections on the possibilities of preserving knowledge and skills used to produce various traditional crafts practices through their translations in digital data and their transmission to the wider public through immersive digital techniques. The analysed craftsmanship studies concern various types of traditional know-how and haptic skills (Fox Miller, 2017) in the form of finger dexterity, hand gestures, broader body movements, human activities, and resulting manufacturing processes.

PAPERS	Authors	Year	Craft sectors	Focus area
Technoculture of Handcraft: Fine Gesture Recognition for Haute Couture Skills Preservation and Transfer in Italy	Marfia et al.	2012	Footwear	Representation
Reframing Haute Couture Handcraftship: How to Preserve Artisans' Abilities with Gesture Recognition	Marfia et al.	2012	Footwear	Representation
Capture, modeling, and recognition of expert technical gestures in wheel-throwing art of pottery	Manitsaris et al.	2014	Pottery	Representation + Presentation
Survey on 3D hand gesture recognition	Cheng et al.	2015	N.D.	Representation
Using Mixed Reality and Natural Interaction in Cultural Heritage Applications	Brondi et al.	2016	Print making	Representation + Presentation
The contemporary geographies of craft-based manufacturing	Fox Miller	2017	N.D.	N.D.
A Multimodal Approach for the Safeguarding and Transmission of Intangible Cultural Heritage: The Case of i-Treasures	Dumitroupulos et al.	2018	Pottery	Representation + Presentation
Tracing the intangible	Flanagan & Fraietta	2019	Embroidery	Representation + Presentation
What is needed to digitize knowledge on Heritage Crafts?	Zabulis et al.	2019	Silk fabric weaving	Representation
Towards a Professional Gesture Recognition with RGB-D from Smartphone	Moñivar et al.	2019	Silk fabric weaving	Representation
TooltY: An Approach for the Combination of Motion Capture and 3D Reconstruction to Present Tool Usage in 3D Environments	Stefanidi et al.	2020	N.D.	Presentation
An approach to the creation and presentation of reference gesture datasets, for the preservation of traditional crafts	Partarakis et al.	2020	Silk fabric weaving	Representation
Transforming Heritage Crafts to Engaging Digital Experiences	Partarakis et al.	2020	N.D.	Presentation
The Application of Digital Technology in the Protection of Intangible Cultural Heritage — Taking Beijing Palace Carpets as an Example	Baitao	2021	Chinese Carpets	Representation + Presentation
Modelling craftspeople for cultural heritage: a case study	Cadi Yazli et al.	2022	Glassblowing	Presentation
Digitisation of traditional craft processes	Zabulis et al.	2022	N.D.	Presentation
Multimodal Narratives for the Presentation of Silk Heritage in the Museum	Hauser et al.	2022	Silk fabric weaving	Presentation
Mixed-Reality Demonstration and Training of Glassblowing	Carre et al.	2022	Glass blowing	Representation + Presentation
3D technologies for intangible cultural heritage preservation—literature review for selected databases	Skublewska Paszkowska et al.	2022	(broader) Crafts, Art, Architecture, Sport	N.D.
Digitizing Intangible Cultural Heritage Embodied: State of the art	Hou et al.	2022	N.D.	Representation + Presentation
Augmented: Design and ethnography in/of an architecture, computer science, and textile, and textile research-creative collective.	Nicholas et al.	2022	Embroidery	Representation + Presentation
CASE STUDIES	Authors	Year	Craft Sector	Focus Area
XYZ | Sensomotoric Interplay of Glass and Body	Wint Design Lab	2021	Glass Blowing	Representation + Presentation
"Artefacts" serie	Sougwen Chung	2019	Painting	Representation + Presentation
Kaarigari–hand blockprinting artisans' movement track	Rashmi Bidasaria	2020	Print Making	Representation + Presentation
Cyberknitics	Ezra Lamb	2016	Knitting	Representation + Presentation

Figure 1. Casciani-Vandi, 2022.

The sectors emerging from the literature regard:

- *Pottery and wheel-throwing,* from the projects i-Treasures (Dimitropoulos et al., 2018) and ArtiMuse (Manitsaris et al., 2014). Both studies offer a methodological framework for capturing, recognizing and modelling expert technical gestures through human-computer interfaces.
- *Glass-blowing hands gesture tracking* used to model and animate a digital avatar for a thematic museum exhibition by Cadi Yazli et al. (2022). On the other hand, Carre et al. (2022) present a process of reverse engineering aimed at the visual and semantic representation and presentation of a historical glass conserved in a museum for educational and preservation purposes. More than this, the project Tacit Dialogues (2021) shows an ongoing, multidisciplinary research focused on the performative qualities of glass-blowing tracked via environmental sensors and sensorized tools whose data are decoded into acoustic patterns enabling the auditive monitoring of the glass maker's movement (Wint Design Lab, 2021).
- *Jacquard weaving techniques* for silk fabric production, explored by Zabulis et al. (2019), Partarakis et al. (2020a), and Cadi Yazli et al. (2022) in the context of the Mingei project. The studies started from the assumption that existing datasets refer only to generic gestures and activities, but no datasets for specific craft practices are available in open access. The authors propose an approach for understanding and articulating human motion recordings into multimodal datasets and VR demonstrations of actions and activities relevant to non-experts in the domain of 3D motion digitization.

- *Embroidery*, with the experiment from Flanagan and Fraietta (2019), aimed at reviving the Chinese Shui ethnic minority horse-tail technique to translate the data maps into visual and sonic experiences for students to promote cultural sustainability. Nicholas et al. (2022) explore how design and ethnography could merge to study bead-weaving stitch types while capturing, modelling and presenting them through immersive tools.
- *Footwear crafting*, presented by Marfia et al. (2012), focused on the analysis and digitization of the manufacturing process of haute-couture footwear. The papers focus on the technologies used for movement tracking and do not clarify how the emerging outputs from the research were used. Missing information may stem from non-disclosure agreements between the authors and the company implied in the research.
- *Printmaking* on textiles (Brondi et al., 2016) focuses on ways of capturing and interpreting the specific and different movements of artisans to be replicated as graphic patterns into textiles using the Jacquard techniques (Bidasaria, 2019).
- Other less explored sectors related to crafts techniques concern Chinese carpet making (Baitao 2022), knitting (Lambchurc, 2016), and painting (Chung, 2019).

3.2. Technologies for Representation of ICH Craftsmanship Creative Acts

The analysis shows that researchers primarily focus on crafts representation areas that mainly concern documentation, reconstruction and protection of crafts embedded knowledge.

Hence "[...] instead of targeting solely result-driven examinations, the ideal usage of such data should facilitate a new model of computation conveying the open-ended information embedded in the bodily practices" (Hou et al., 2022, p. 3).
In this regard, Motion Capture (MoCap) technologies – categorised into mechanical, magnetic, and optical capture, leveraging systems that are camera-based, sensor-based, or a hybrid of both – result to be the most popular in ICH archiving, allowing data collection to be neutral, simultaneous, thereby fostering a perceivable human presence in the virtual cultural heritage environments (Chalmers et al., 2021).

Other authors propose technological applications defined by the typology of body gestures to record, usually differentiating them into coarse and fine (Marfia et al., 2012; Cheng et al., 2015; Partarakis et al., 2020a).
Coarse gestures concern repeated, low-precision actions that involve the whole body (e.g., moving an object from one end to another of a lab), quickly tracked through MoCap marker-less sensors or inertial motion sensors continuously and in real-time (i.e., Wii) (Manitsaris et al., 2014), but also by simple visual tracking technologies able to recognize the movement from video recordings.
Hands perform actions that involve fine gestures in all those cases where a high degree of precision is required (Marfia et al., 2012), and both hands and finger movements need to be recognized. Even though not robust to occlusions, marker-based sensors are the most performative for fine-grained gestures, using optical markers and active computer vision, which require expensive commercial systems (Manitsaris et al., 2014).

Cheng et al. (2015) introduced a subdivision of the core 3D fine gestures recognition approaches mainly focusing on finger movements: (i) 3D hand modelling based on the estimation of the articulated hand poses and motions, (ii) static hand gestures recognition usually capturing the palm and finger postures, (iii) hand trajectory gesture recognition containing both trajectory and static gestures also recognized leveraging the Kinect skeleton system and finally (iv) continuous hand gesture recognition aimed at detecting when a gesture starts and when it ends from hand motion trajectories.

Other complementary approaches emerged from ArtiMuse Project (Manitsaris et al., 2014), implying the use of wireless inertial sensors and statistical modelling implemented into a human-computer interface, or the application introduced by the project Mingei called Animation Studio, enabling visualisation, editing, and semantic annotation of pertinent data acquired by MoCap (Partarakis et al., 2020a).

3.3. Technologies for the Presentation of ICH Craftsmanship Creative Acts

Papers related to technologies for the presentation of ICH craftsmanship creative acts are a minority. According to Partarakis et al. (2020b), presentation address the need to exploit and decode representation to promote cultural sustainability, "conserve cultural resources, contribute to their accurate interpretation, provide essential and authentic experiences […]" (Partarakis et al., 2020b). ICH's traditional curatorial approaches increasingly integrate interdisciplinary, data-driven, and multimodal perspectives (Hou et al., 2022), advancing

technical innovations beyond object-centred display through digital technologies' opportunities.

Therefore, representation applications assume an *informational* connotation, developing virtual platforms/portals to connect MoCap-derived data to other culture-intensive heterogeneous contents, defining the archive context as a more "analytical, semantic, and interlinked entity accessing communities' digitised environments" (Hou et al., 2022). To this end, Zabulis et al. (2022) and Stefanidi et al. (2021) developed a multiple-user system platform where craft representations can be collaboratively authored, shared, displayed, and digitally preserved in standardized formats while Carre et al. (2022) introduced the Motion Vocabulary as a tool for transmitting and explaining gestural skills data to wider audiences.

Another presentation practice dimension is related to *storytelling*, whose applications are allowed by technologies belonging to the reality-virtuality continuum (Milgram et al., 1994), i.e., the process described by Cadi Yazli et al. (2022), to design digital humans to virtually represent craft workers for an XR museum exhibition. Storytelling may be implemented through augmentations of the craft workspace with virtual characters acting as guides, VR environments that provide immersive storytelling experiences, and dissemination through online virtual storytelling applications, as for the VR demonstrations related to silk weaving (Partarakis et al., 2020b) translating motion retargeting to Virtual Humans, or VR technology generating the gamified experience of carpet weaving (Baitao, 2022). Other storytelling experiments about the presentation of crafts gestures could also converge in contemporary art,

exploiting the freedom and cutting-edge explorative dimension that only artistic practices can enable.

This is the case of *XYZ | Sensomotoric Interplay of Glass and Body* by Wint Design Lab (2021) and *Cyberknitics* by Ezra Lamb (2016), offering visual and sound reinterpretations of the individual movement of the artist to the physical resonance within respectively a glass-blown piece or a knitting activity. In tandem, the artist Sougwen Chung (2019), through the series Artefact explores artistic co-creation through improvisational drawing collaboration with a collaborative robot trained on the artist's movement when drawing. The project of Rashmi Bidasaria (2020) parallels the gestures of hand block printing with Jacquard weaving, translating through digital recordings the analogue movements and gestures of craftspeople's stamps into graphic patterns automatically woven.

Educational applications aim to teach future professionals or robotic machines through cultural heritage skill learning experiences. First-person acquaintance applications to basic skills can be implemented through MR, which could allow the manipulation of virtual and physical objects and tools. To this end, Flanagan and Fraietta (2019) introduced their study on Japanese horse-tail embroidery to Guiyang students to carry their cultural traditions while innovating them with creativity and contemporary insights. Moreover, they propose an interactive media museum interface for a growing repository through encoding traditional crafts practices.

Brondi et al. (2016) introduced a virtual environment where users can freely explore the space around the artisan and

overlap their own hands with the encoded hands of the artisan to learn how to perform some of the actions needed during the work of weavers. Manitsaris et al. (2014) reported the establishment of sonic and optical feedback to the learner through a digital presentation, driving him/her to correct his/her gestural errors. More conservatively, after having captured and modelled crafts gestures through HoloLens and 3D modelling software, Nicholas et al. (2022) reintroduced them to the physical environment through a community-based bead-weaving workshop to empower refugee and immigrant women from different parts of Africa and the Middle East, toward cultural and social sustainability.

4. Discussion and Conclusions

Based on the analysis, the fashion industry has not yet implemented systematic research attempts to safeguard its cultural heritage, despite being the sector's most remarkable peculiarity in sociocultural, semiotic, and industrial development terms. In a craft-based sector like fashion, the growth of craft production models results in the diffusion of economic power (Fox Miller, 2017), as craft producers increasingly compete with large-scale mass producers that globalization has favoured during the last decade. In this context, technological advances could play a significant role in enabling the revival of small-scale craft manufacturing towards cultural sustainability. A design-driven approach based on ethnography could therefore have the power to integrate these scattered experiments within the fashion system to enable the development of products/systems with high narrative content, local knowledge, and identity as a stimulus for innovation (Vacca, 2012).

Conversely, any attempt to transmit and communicate fashion craftsmanship ICH has always clashed with a conservative industry that is reluctant to the widespread dissemination of the craftsmanship and know-how contained within a high-fashion product. In addition, technologies bring the fear of ICH being copyrighted or patented by outsiders of the local communities and owners of the crafts' creative acts, increasing the secretive and closed attitude toward technologies, even if adopted to safeguard ICH practices and knowledge (George, 2010).

The issue of openness of digital data against data protection of the fashion sector is an argument of critical reflection considering that the digitalization of ICH eases data replication, conversion, manipulation, and recombination, and thereby supports the democratic cultural remix of information and products (Brennen & Kreiss, 2016), but also needs to have a disciplined way to convey information, meanings, and memories, to avoid impoverishment of local knowledge against mass globalisation and cultural appropriation.

To do so, an interdisciplinary, collaborative, and systemic environment is required at the onset and during activities related to the presentation of fashion craftsmanship ICH. Indeed, engineering expertise (e.g., robotics, mechatronics, mechanical and electrical engineering, and computer science) should be coupled with social sciences and humanities (e.g., sociology, socio-technical studies, digital humanities, history, anthropology, and cultural studies) to exploit technologies for sociocultural production. In this context, design is conceived as "a creative and proactive attitude to filter, transfer

and connect different bodies of knowledge to shape innovative solutions" (Banerjee & Ceri, 2015), being a crucial lever in mediating among the aforementioned interdisciplinary fields. This collaboration could contribute to select technologies and computational methods to extrapolate and digitalize tacit knowledge embedded in artisans' "bodily skills, technical knowledge of tools and techniques, trained sensory capacities, knowledge of materials, and stylistic preferences" (Giaccardi & Redström, 2020) and to support data interpretation through critical and historical comparisons with contextual data related to the political, social, cultural environment where fashion craftsmanship ICH are situated.

Digital technologies still show limitations in replicating and replacing the highly specialised perceptual and manipulation skills and the creative abilities of fashion craftspeople (Frey & Osborne, 2013). This recorded and archived gestural data from "creative acts" do not directly translate and give access to cognitive information that links crafts people's hands and heads.

Besides, the technological limitations in data collection can be mediated through an interpretation at the presentation stage using useful technologies and storytelling skills to narrate the experience in a holistic, thick, and complex manner. To date, ICH presentation projects offer a vertical and specific viewpoint of creative acts, often reproducing a single aspect in highly interactive modes of fruition that present limited connections with the socio/historical/cultural contexts. The creative acts are also often presented by abstracting the data from its context as synaesthetic outputs. Here, the data

abstraction and act reinterpretation process are not usually unfolded but are used within performative artistic disciplines, and data visualisation approaches, even though they do not imply the restitution and preservation of cultural heritage. On the contrary, some examples of ICH presentation use digital platforms in the format of digital archives that allow the complex replication of data related to the historical and sociocultural contexts where creative acts occur but often lose effectiveness and offer a passive user experience.

The resulting guidelines consider the related challenges of the fashion craftsmanship sector and focus on the role of design as both an encoder and decoder of the inner knowledge lying in culture-intensive artefacts.

In particular, *design in the role of data sense-making* can:

- *Take on challenges related to data manipulation* among different technologies and platforms while still guaranteeing safeguard of the know-how peculiar to the fashion industry through protection policies (i.e., non-fungible-token). This will ensure the preservation and encourage the transmission of the ICH's "creative acts" in the fashion and high-end goods market.
- *Encode ICH knowledge to promote interdisciplinary education* through capacity-building materials and educational toolkits delivered to different actors such as students, craftspeople, and start-uppers to favour long-term resilience and economic and creative capacity of the fashion crafts economy. Didactic purposes should embrace the

need to narrate crafts processes to interpret data holistically, not only through gestural encoding but also concerning historical-critical contextualization. This will upskill craftspeople toward international competitiveness and job creation while reviving traditional enterprises with augmented and hybridised capacities that could attract young professional talents and boost entrepreneurship.

Moreover, *design in the role of hyper-sensorial experiences elucidator* can:

- *Build an integrated media architecture* through interactive storytelling, embodied museology, and gamified engagement (Hou, 2022) that focus on how different ways of digitising and digitalizing creative acts could impact the presentation and representation of fashion craftsmanship ICH as well as multiply the narrative levels of cultural experiences.
- *Manage the inclusion of virtual tactile experiences* through haptic devices and low-technology haptic visuality films to provide tactile feedback to a hand or finger in virtual reality and hyper-sense encoded data for memory elicitation. Haptinc interfaces for human-computer interaction, virtual reality, and human-robot interaction could improve the sense of touch that is essential for an industry like fashion, providing "perceptual cues in the form of forces, displacements, electrical, thermal, or other signals delivered to the skin and body" (Zhu et al., 2022).

Therefore, *design becomes the creative encoder of new narratives and meanings from data*, representing the intangible

side of creative acts in non-linear and philological ways through interpretation and synaesthetic conversions to reveal and unveil covered data in new forms. In addition, *design keeps the role of the decoder of new fruition and interaction modalities with ICH* through emerging media technologies, favouring a complete representation of sociocultural, manufacturing and tech-related dimensions lying tacitly behind culture-intensive practices.

Ultimately, *design favours "cultural sustainability"* (Brown & Vacca, 2022) as the lever to preserve communities' representative material cultures and to strengthen craftsmanship's role in expressing traditional culture. Cultural sustainability will be fostered by using past knowledge to create new trajectories that can provide interdisciplinary ecosystems with insights and directions needed for building a cultural and sustainable future.

References

Baitao, J., (2022). The Application of digital technology in the protection of intangible cultural heritage - Taking Beijing Palace Carpets as an example. In Y. Zhang, & S. Zhang (Eds.), *Proceedings of the 2021 Conference on Art and Design: Inheritance and Innovation (ADII 2021)* (pp. 35-40). Atlantis Press. https://dx.doi.org/10.2991/assehr.k.220205.006

Banerjee, B., & Ceri, S. (2015). *Creating innovation leaders: A global perspective*. Springer Verlag.

Bertola, P., Vacca, F., Colombi, C., Iannilli, V. M., & Augello, M. (2016). The cultural dimension of design driven innovation: A perspective from the fashion industry. *The Design Journal*, *19*(2), 237-251. https://doi.org/10.1080/14606925.2016.1129174

Bidasaria, R. (2019). *Rashmi Bidasaria*. Royal College of Art. https://2020.rca.ac.uk/students/rashmi-bidasaria

Brennen, J. S., & Kreiss, D. (2016). Digitalization. In K.B. Jensen, E.W. Rothenbuhler, J.D. Pooley, & R.T. Craig (Eds.), *The International Encyclopedia of Communication Theory and Philosophy* (pp. 1-11). Wiley. https://doi.org/10.1002/9781118766804.wbiect11

Brondi, R., Carrozzino, M., Lorenzini, C., & Tecchia, F. (2016). Using mixed reality and natural interaction in cultural heritage applications. *Informatica*, *40*(3), 311-316. https://www.informatica.si/index.php/informatica/article/view/1434/907

Brown, S., & Vacca, F. (2022). Cultural sustainability in fashion: reflections on craft and sustainable development models. *Sustainability: Science, Practice and Policy*, *18*(1), 590-600. https://doi.org/10.1080/15487733.2022.2100102

Cadi Yazli, N., Baka, E., Magnenat-Thalmann, N., Kaplanidi, D., Partarakis, N., Karuzaki, E., Zidianakis, M., Pattakos, A., & Zabulis, X. (2022). Modeling craftspeople for cultural heritage: A case study. *Computer Animation & Virtual Worlds*, *33*(3-4), 1-16. https://doi.org/10.1002/cav.2075

Carre, A. L., Dubois, A., Partarakis, N., Zabulis, X., Patsiouras, N., Mantinaki, E., Zidianakis, E., Cadi, N., Baka, E., Magnenat Thalmann, N., Makrygiannis, D., Glushkova, A., & Manitsaris, S. (2022). Mixed-reality demonstration and training of glassblowing. *Heritage*, *5*(1), 103-128. https://doi.org/10.3390/heritage5010006

Chalmers, A., Parkins, J., Webb, M., & Debattista, K. (2021, June). Realistic humans in virtual cultural heritage. In M. Shehade, & T. Stylianou-Lambert (Eds.), *Emerging technologies and the digital transformation of museums and heritage sites* (pp. 156-165). Springer.

Cheng, H., Yang, L., & Liu, Z. (2015). Survey on 3D hand gesture recognition. *IEEE transactions on circuits and systems for video technology*, *26*(9), 1659-1673. https://doi.org/10.1109/TCSVT.2015.2469551

Chung, S. (2019). *Artefact 1*. https://sougwen.com/project/artefact1

Churchill, E. F., Nelson, L., & Sokoler, T. (2005). Tools that tell tales: Bridging context seams by digitally annotating physical artifacts. In *Proceedings of the Workshop on Smart Object Systems in Conjunction with the Seventh International Conference on Ubiquitous Computing (UbiComp 2005)*. ACM.

Churchill, E. F., Gooen, O., & Shamma, D.A. (2010). Augmented ethnography: Designing a sensor-based toolkit for ethnographers. In S. Viller, & B. Kraal (Eds.), *OzCHI '10: Proceedings of the 22nd Conference of the Computer-Human Interaction Special Interest Group of Australia on Computer-Human Interaction* (pp. 416-417). ACM. https://doi.org/10.1145/1952222.1952323

Cominelli, F., & Greffe, X. (2012). Intangible cultural heritage: Safeguarding for creativity. *City, Culture and Society, 3*(4), 245-250. https://doi.org/10.1016/j.ccs.2012.10.003

Dimitropoulos, K., Tsalakanidou, F., Nikolopoulos, S., Kompatsiaris, Y., Grammalidis, N., Manitsaris, S., Denby, B., Crevier-Buchman, L., Dupont, S., Charisis, V., Hadjileontiadis, L., Pozzi, F., Marius Cotescu, Çiftçi, S., Katos, A., & Manitsaris, A. (2018). A multimodal approach for the safeguarding and transmission of intangible cultural heritage: The case of i-Treasures. *IEEE Intelligent Systems*, *33*(6), 3-16. https://doi.org/10.1109/MIS.2018.111144858

Lambchurc, E. (2016). *Cyberknitics. A garment that translates the rhythm of knitting into sound* [Thesis dissertation]. https://ezralamb.com/cyberknitics.html

European Commission, Executive Agency for Small and Medium-sized Enterprises. (2016). *Boosting the competitiveness of cultural and creative industries for growth and jobs: final report*. Publications Office. https://data.europa.eu/doi/10.2826/526239

Euratex. (2020). *Facts & key figures of the European textile and clothing industry*. https://euratex.eu/wp-content/uploads/EURATEX-Facts-Key-Figures-2020-LQ.pdf

European Commission. (2019). *Textiles, fashion and creative industries*. https://ec.europa.eu/growth/sectors/fashion_en

Flanagan, P. J., & Fraietta, A., (2019). Tracing the intangible: the curious gestures of crafts' cultural heritage. In R. Harle, K. Farrahi, & N. Lane (Eds.), *UbiComp/ISWC '19 Adjunct: Adjunct Proceedings of the 2019 ACM International Joint Conference on Pervasive and Ubiquitous Computing and Proceedings of the 2019 ACM International Symposium on Wearable Computers* (pp. 49-52). https://doi.org/10.1145/3341162.3343799

Fox Miller, C. (2017). The contemporary geographies of craft-based manufacturing. *Geography Compass*, *11*(4). https://doi.org/10.1111/gec3.12311

Frankjaer, R., & Dalsgaard, P. (2018). Understanding craft-based inquiry. In I. Koskinen, L. Youn-kyung, T. Cerratto-Pargman, K. Chow, & W. Odom (Eds.), *DIS '18: Proceedings of the 2018 Designing Interactive Systems Conference* (pp. 473-484). ACM. https://doi.org/10.1145/3196709.3196750

George, E.W. (2010). Intangible cultural heritage, ownership, copyrights, and tourism. *International Journal of Culture, Tourism and Hospitality Research*, *4*(4), 376-388. https://doi.org/10.1108/17506181011081541

Giaccardi, E., & Redström, J. (2020). Technology and More-Than-Human Design. *Design Issue*, *36* (4), 33–44. https://doi.org/10.1162/desi_a_00612

Hou, Y., Kenderdine, S., Picca, D., Egloff, M., & Adamou, A. (2022). Digitizing intangible cultural heritage embodied: State of the art. *Journal on Computing and Cultural Heritage*, *15*(3), 1-20. https://doi.org/10.1145/3494837

Konstantakis, M., & Caridakis, G. (2020). Adding culture to UX: UX research methodologies and applications in cultural heritage. *Journal on Computing and Cultural* Heritage, *13*(1), 1-17. https://doi.org/10.1145/3354002

Manitsaris, S., Glushkova, A., Bevilacqua, F., & Moutarde, F. (2014). Capture, modeling, and recognition of expert technical gestures in wheel-throwing art of pottery. *Journal on Computing and Cultural Heritage*, *7*(2), 1-15. https://doi.org/10.1145/2627729

Marfia, G., Roccetti, M., Marcomini, A., Bertuccioli, C., & Matteucci, G. (2012). Reframing haute couture handcraftship: how to preserve artisans' abilities with gesture recognition. In A. Nijholt, T. Romão, D. Reidsma (Eds.), *Advances in Computer Entertainment. ACE 2012* (pp. 437-444). Springer. https://doi.org/10.1007/978-3-642-34292-9_32

Milgram, P., & Kishino, F. (1994). A taxonomy of mixed reality visual displays. *IEICE TRANSACTIONS on Information and Systems*, *77*(12), 1321-1329. https://cs.gmu.edu/~zduric/cs499/Readings/r76JBo-Milgram_IEICE_1994.pdf

Nicholas, C., Forren, J., & Reilly, D. (2022). Augmented: Design and ethnography in/of an architecture, computer science, and textile research-creative collective. In D. Lockton, S. Lenzi, P. Hekkert, A. Oak, J. Sádaba, & P. Lloyd (Eds.), *DRS2022*. Design Research Society. https://doi.org/10.21606/drs.2022.417

O'Sullivan, D., & Igoe, T. (2004). *Physical computing: sensing and controlling the physical world with computers*. Course Technology Press.

Partarakis, N., Zabulis, X., Chatziantoniou, A., Patsiouras, N., & Adami, I. (2020a). An approach to the creation and presentation of reference gesture datasets, for the preservation of traditional crafts. *Applied Sciences*, *10*(20), 7325. https://doi.org/10.3390/app10207325

Partarakis, N., Zabulis, X., Antona, M., & Stephanidis, C. (2020b). Transforming heritage crafts to engaging digital experiences. In F. Liarokapis, A. Voulodimos, N. Doulamis, & A. Doulamis (Eds.), *Visual Computing for Cultural Heritage* (pp. 245-262). Springer. https://doi.org/10.1007/978-3-030-37191-3_13

Sennett, R. (2009). *The craftsman*. Yale University Press.

Skublewska-Paszkowska, M., Milosz, M., Powroznik, P. et al. (2022). 3D technologies for intangible cultural heritage preservation—literature review for selected databases. *Heritage Science, 10*(1), 1-25. https://doi.org/10.1186/s40494-021-00633-x

Stefanidi, E., Partarakis, N., Zabulis, X., Zikas, P., Papagiannakis, G., & Magnenat Thalmann, N. (2021). TooltY: An approach for the combination of motion capture and 3D reconstruction to present tool usage in 3D environments. In N.M. Thalmann, J.J. Zhang, M. Ramanathan, D. Thalmann (Eds.), *Intelligent Scene Modeling and Human-Computer Interaction* (pp. 165-180). Springer. https://doi.org/10.1007/978-3-030-71002-6_10

Tacit Dialogues. (2021). https://tacitdialogues.com/

UNESCO. (2003). *Text of the Convention for the Safeguarding of the Intangible Cultural Heritage -intangible heritage.* Culture Sector. https://ich.unesco.org/en/convention

Vacca, F. (2012). Silent witnesses innovation through tradition in Italian fashion companies. *Research Journal of Textile and Apparel*, *16*(4), 48-58. https://doi.org/10.1108/RJTA-16-04-2012-B006

XYZ | Sensomotoric Interplay of Glass and Body by WINT Design Lab. (2022). Tacit Dialogues. https://tacitdialogues.com/

Zabulis, X., Meghini, C., Partarakis, N., Kaplanidi, D., Doulgeraki, P., Karuzaki, E., ... & Beisswenger, C. (2019). What is needed to digitize knowledge on Heritage Crafts? *Memoria Media Review*, *4*, 1. https://www.researchgate.net/publication/339435537_What_is_needed_to_digitise_knowledge_on_Heritage_Crafts

Zabulis, X., Meghini, C., Dubois, A., Doulgeraki, P., Partarakis, N., Adami, I., ... & Kaplanidi, D. (2022). Digitization of traditional craft processes. *Journal on Computing and Cultural Heritage*, *15*(3), 1-24. https://doi.org/10.1145/3494675

Zhu, M., Biswas, S., Dinulescu, S.I., Kastor, N., Hawkes, E.W., & Visell, Y. (2022). Soft, wearable robotics and haptics: Technologies, trends, and emerging applications. *Proceedings of the IEEE*, *110*(2), 246-272. https://doi.org/10.1109/JPROC.2021.3140049

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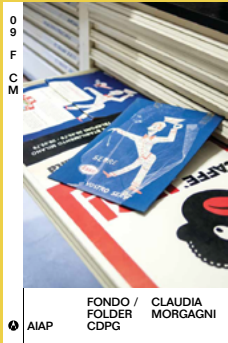michele.zannoni@unibo.it

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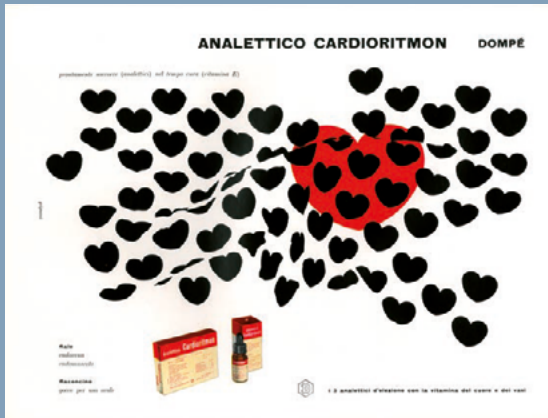
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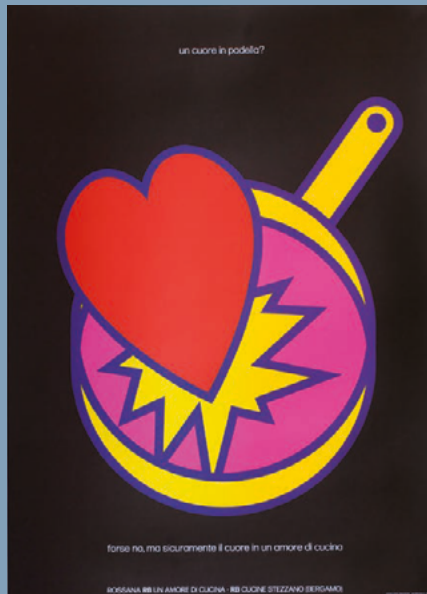
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