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# ARTIFICIAL INTELLIGENCE IN CREATIVE INDUSTRIES: A CONCEPTUAL REVIEW OF CREATIVE ROBOTICS AND HUMAN-ROBOT INTERACTION

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## ABSTRACT

This conceptual paper critically examines how artificial intelligence (AI) connects creative industries, creative robotics, and human–robot interaction (HRI). Although AI-assisted cultural production is widely discussed, the relationship between software-based content generation and physically embodied robotic collaboration remains insufficiently differentiated. Drawing on a critical, purposively selected literature base spanning computational creativity, media production, socio-technical studies, and HRI, the paper develops an interpretive synthesis of four dimensions: creative augmentation; embodied co-creation; creative agency, labour, and authorship; and ethical governance and cultural sustainability. The literature suggests that AI can support ideation, generation, adaptive feedback, and interactive creation, although implications for originality, professional authority, and participation depend on context. Unlike software-only applications, creative robots introduce spatial coordination, material action, and reciprocal feedback into artistic activity. The paper advances a socio-technical framework distinguishing these modes of collaboration and linking them to institutional and cultural conditions. Practical implications concern human-centred workflow design, transparent attribution, interdisciplinary education, and inclusive governance. The framework is an analytical proposition rather than an empirically validated model; its application requires further workplace and HRI research.

**Keywords:** Artificial Intelligence; Creative Industries; Creative Robotics; Human-Robot Interaction; Creative Agencies

## INTRODUCTION

The Artificial intelligence (AI) is increasingly integrated into film, music, visual arts, literature, and design. Generative systems can produce preliminary text, imagery, sound, and design variations, while interactive computational systems can provide feedback during creative work. These developments reopen long-standing questions about originality, human intention, and the conditions under which technologies participate in cultural production (Boden, 2004; Colton & Wiggins, 2012; McCormack et al., 2019). The resulting debate concerns more than technological capability. It is because creative industries are organised through professional judgement, unequal access to resources, institutional priorities, and cultural expectations (Hesmondhalgh & Baker, 2011; Ploin et al., 2022).

Creative-sector applications nevertheless differ substantially in their production requirements. A film editor using generated images for early storyboards, a musician experimenting with synthesised sounds, and a designer directing a drawing robot may all employ machine-learning tools. Yet their working relationships with technology are not equivalent. Production conventions establish who may approve a final output, how teams allocate credit, and what counts as technical or artistic expertise. Market structures also determine whether a useful tool becomes an accessible resource or another dependency on commercial platforms. A critical account therefore needs to ask not only whether an AI system creates plausible content, but where it enters the sequence of commissioning, development, production, evaluation, and distribution. Such attention prevents technical demonstrations from being mistaken for comprehensive accounts of professional adoption and makes the paper relevant to creative industries rather than to artificial intelligence in isolation (Flew, 2013; Hesmondhalgh & Baker, 2011, Gao et al., 2024). The sectoral breadth of the original discussion remains important: film and animation involve sequential approval of scripts and images; music involves composition and sound arrangement; visual design involves prototyping and stylistic negotiation; and fashion connects aesthetic invention with material, commercial, and sustainability considerations (McIntyre, 2012, Gao et al., 2024).

The relationship between AI and robotics requires particular care. A language model that assists a screenwriter is not a robot, and an image generator does not by itself constitute human–robot interaction (HRI). Creative robotics concerns artistic work involving physically embodied robotic systems, which may perceive a human participant, adapt their movements, manipulate materials, or collaborate through coordinated action. HRI therefore adds questions of physical space, timing, bodily presence, safety, and responsive interaction to the issues raised by software-based human–AI collaboration. Studies of co-drawing robots and social robots engaged in storytelling help make these differences visible (Elgarf et al., 2024; Gao et al., 2024).

Existing scholarship offers important, but differently focused, perspectives. Computational creativity studies consider generative capacities and assessments of novelty; HRI research explores interaction and user response; studies of creative labour examine skills, agency, and production contexts; and socio-technical scholarship asks how human and machine action become configured in situated practices (Runco, 2023; Suchman, 2012; Yu, 2025). The problem addressed here is not an absence of scholarship in these fields. Rather, their findings require synthesis that differentiates AI-supported content creation from embodied robotic co-creation while explaining the institutional conditions that shape their cultural significance.

The principal difficulty is conceptual and evidential. Technical research may describe how a model learns or a robot executes a task, while media-industry research asks how organisations produce cultural value and distribute work. These literatures use different units of analysis, outcome measures, and assumptions about agency. A robot capable of drawing a portrait in a controlled environment does not thereby demonstrate a change in the economics of animation or television production. Conversely, a study of artists' engagement with generative software does not establish what happens when a physical robot shares a workspace with people. The proposed synthesis bridges these levels without erasing their

differences. Its explanatory task is to connect computational affordances to situated interaction and then to the wider social conditions that determine which creative possibilities are adopted, valued, rejected, or constrained (Suchman, 2012; Ploin et al., 2022).

This paper aims to critically examine how AI mediates relationships among human creativity, creative robotics, and HRI within the creative industries, with attention to creative agency and socio-technical implications. It asks: (RQ1) How does AI mediate creative processes and human–robot collaboration? (RQ2) What socio-technical, ethical, and cultural conditions shape AI-mediated creativity and embodied HRI? Rather than seeking exclusively positive impacts, the analysis evaluates benefits, limitations, and tensions across the literature.

The paper contributes a conceptual distinction between software-based human–AI collaboration and physically embodied human–robot co-creation, embedded in an explanatory framework linking creative agency, AI mediation, robotic embodiment, and the governance of cultural production. The following sections review relevant debates, describe the scope and logic of the conceptual synthesis, present four analytical themes, and develop their implications for creative practice and research.

## RELATED LITERATURE

### Human Creativity as Situated Cultural Practice

Human creativity entails the development and evaluation of ideas within individual, social, and cultural settings. Creativity scholarship distinguishes processes of ideation, judgements of originality, and the usefulness or appropriateness of outputs; it also cautions against treating a novel-looking product as sufficient evidence of an equivalent creative process (Boden, 2004; Runco & Acar, 2012; Runco, 2023). In cultural industries, however, originality is not simply an individual cognitive property. It is shaped through teams, professional conventions, genres, audience expectations, organisational decisions, and access to resources (Flew, 2013; Hesmondhalgh & Baker, 2011).

A useful distinction concerns the evaluation of creative products, the organisation of creative processes, and the allocation of creative responsibility. A generated image may be assessed for novelty or aesthetic appeal without revealing whether the person using it exercised meaningful judgement or acquired a new skill. Similarly, the speed of producing a design variation does not establish whether the finished work represents a community fairly, meets the client's aims, or offers a distinctive cultural perspective. These different evaluative standards are particularly important when practitioners work collectively. Directors, editors, performers, designers, technicians, and commissioners may each contribute to the meaning of a finished work in ways that remain invisible in output-centred assessments. Consequently, AI-supported creativity should be examined as a sequence of choices and relationships, not merely as a property inferred from the surface appearance of a cultural artefact (Hesmondhalgh & Baker, 2011; McCormack et al., 2019). This perspective is compatible with the original manuscript's emphasis on economic and cultural evolution: commercially viable creative work can sustain employment and public expression, but sales or volume alone do not measure originality or collective cultural value (Flew, 2013; McIntyre, 2012).

This contextual position complicates the claim that human creativity is "irreplaceable." Although artistic intention and accountability remain vital, such a claim should not be treated as a self-evident empirical finding. A more defensible question is how particular creative responsibilities are distributed when computational systems generate options and human practitioners select, revise, reject, contextualise, and take responsibility for them. Distinguishing contribution, attribution, and decision-making avoids reducing creative agency either to the individual artist or to the algorithm alone (McCormack et al., 2019; Ploin et al., 2022).

This approach is also necessary for understanding cultural variation. Established accounts of creative industries can privilege familiar centres of commercial media production, while artistic value is

judged differently across linguistic communities, genres, and institutional traditions. Machine-generated work may reproduce well-represented styles more readily than less visible cultural practices if its training material reflects unequal access to digitised resources. Yet the presence of a culturally recognisable style does not by itself indicate respect for its origins or the participation of the people who sustain it. Questions of consent, attribution, translation, local interpretation, and intergenerational transmission therefore belong within an account of creativity itself. The issue is not whether technology should be accepted or rejected universally, but how particular creative communities retain authority to define the significance and appropriate use of their traditions (UNESCO, 2021)

**Generative AI and Human–AI Co-Creation**

Machine-learning models support creative work by learning patterns from existing material and producing or transforming candidate outputs. Generative adversarial networks established one influential approach to generating synthetic content (Goodfellow et al., 2014); subsequent applications explored aesthetic variation and the computational production of visual art (Elgammal et al., 2017). Music-generation research similarly details how learned representations support composition and arrangement, without resolving questions of artistic intention or evaluation (Briot et al., 2020). Contemporary design research considers AI both a co-creator and a material that designers actively interrogate (Yu, 2025).

Illustrative examples retained from the original discussion include neural style transfer, associated with the work of Gatys et al. (2015), music-generation systems discussed by Briot et al. (2020), and early large-language-model applications for text drafting (Brown et al., 2020). Such applications help explain why film, animation, design, writing, and music practitioners might experiment with computational tools. They are historical examples of software-based AI rather than direct evidence of creative robotics, and their practical contribution depends on human selection, revision, and institutional approval. Claims that such works are categorically indistinguishable from human-authored outputs would require independent comparative evidence.

Distinguishing techniques from practices prevents technological determinism. Generative adversarial networks, variational approaches, and large language models are different ways of producing or representing digital material; none is intrinsically a collaborative robot. Their contributions become relevant to physical robotics only when connected with sensing, planning, movement, or interaction mechanisms that affect a shared environment. In software-only workflows, creators typically mediate between prompts or inputs and selected outputs through a screen or another interface. In robotic workflows, a generated or inferred plan may influence a physical action whose timing, spatial trajectory, or material consequences must be negotiated with a human participant. These distinctions identify where the bridge actually operates: the combination of computation with situated creative activity. It is therefore analytically preferable to specify the system, task, interface, and human role rather than to treat the broad label 'AI' as a sufficient description of collaborative capability (Goodfellow et al., 2014; Suchman, 2012).

However, facilitation is not equivalent to a general improvement in creativity. In experimental short-story writing, Doshi and Hauser (2024) reported improvements in the evaluation of AI-assisted stories but also greater similarity across outputs. Medeiros et al. (2025) likewise interrogate whether collaboration with a language model improves dimensions of human creativity. These contributions call for a distinction between individual gains, collective diversity, and longer-term dependence. The language of “human–AI partnership” may obscure who determines creative goals, curates prompts, holds rights to outputs, and evaluates quality.

The contrasting findings raise a further problem of scale. A participant may judge a single output to be more fluent or interesting while the collective field becomes less diverse when many practitioners rely on similar generated suggestions. This is especially consequential in cultural production, where the social value of a sector is partly connected to plurality of voices, styles, languages, and interpretations.

The studies cannot establish that all AI-supported art will converge; their methods and creative tasks are bounded. Nevertheless, they challenge the simple equation between more efficient generation and greater cultural innovation. Reviewers, commissioners, and educators therefore need criteria that extend beyond immediate user satisfaction or productivity. Such criteria might include variation across a collection of outputs, the visibility of underrepresented voices, the extent of substantive revision by practitioners, and the ability to reject or redirect machine suggestions (Doshi & Hauser, 2024; Yu, 2025).

**Creative Robotics and Embodied HRI**

Creative robotics differs from software-based content generation because a robot acts through a physical system within a material or social environment. In a collaborative portrait-drawing system, people and a robot alternately contribute strokes to a shared canvas, making coordination and the interpretation of human intentions central to the task (Gao et al., 2024). In collaborative storytelling with social robots, Elgarf et al. (2024) observed different outcomes across experimental conditions: the wizard-operated robot did not yield the same demonstrated effects as an autonomous system in their studies of children. These cases show that interaction architecture, degree of autonomy, and design of responses affect what collaborative creativity can mean.

Embodiment is significant because it modifies both the practical task and the observable distribution of action. In a digital design workflow, an unsatisfactory image can often be discarded without changing the physical environment. In robotic drawing, an incorrect stroke may alter a surface that both participants must subsequently accommodate. In live performance or a participatory exhibition, movement, delay, proximity, and audience anticipation may become constituents of aesthetic experience. This does not mean that all creative robots must possess sophisticated autonomy. Some can follow predetermined sequences; others can respond to sensor input or human cues; still others may rely on remote human operation. For critical analysis, these distinctions are essential because an apparently responsive performance could reflect scripted behaviour, human control behind the scenes, or a degree of computational adaptation. Each configuration supports a different account of collaboration, autonomy, and attribution (Gao et al., 2024; Suchman, 2012).

Neither example should be overgeneralised. A laboratory drawing system and educational storytelling with children do not establish the effectiveness of robotics across film, television, fashion, or other creative workplaces. Instead, they offer mechanistic evidence that embodiment adds bodily coordination, adaptive action, and immediate feedback. This justifies treating HRI as a distinct level of analysis rather than using software examples as proxy evidence for robotic collaboration.

The reviewed HRI examples illustrate an important distinction between facilitating creativity and measuring it. A drawing robot can be evaluated by the precision or coherence of its contributions, the participant's experience of coordination, or the originality of the resulting artwork. A storytelling robot may be assessed through fluency, flexibility, elaboration, or originality in participants' responses. These measures capture different aspects of the encounter and cannot be directly combined into a single claim that robots make people more creative. The social setting also matters: children interacting with a robot during an educational activity have different incentives, power relations, and capacities than paid professionals working to deadlines. This paper consequently uses robotics studies to identify mechanisms of embodied interaction, not as proof of transferable commercial outcomes. That methodological distinction protects the synthesis from overclaiming the industrial significance of limited experimental studies (Elgarf et al., 2024; Gao et al., 2024).

**Critical Media and Socio-Technical Perspectives**

A socio-technical approach situates technological capability within real configurations of people, institutions, materials, and practices. Suchman (2012) challenges accounts that isolate machine behaviour from situated human action, providing a way to examine how apparent machine autonomy is structured

by design choices and interaction settings. Creative-labour scholarship similarly shows that media work takes place under organisational constraints and uneven power relations (Hesmondhalgh & Baker, 2011). These approaches complicate deterministic claims that the arrival of AI inevitably democratises cultural production.

This perspective also alters how innovation is understood. A technically sophisticated prototype may be unusable in a production setting where practitioners lack time for training, cannot verify output provenance, or must comply with safety and contractual requirements. Conversely, a relatively simple tool may become influential when it fits existing routines, allows meaningful revision, and supports collective work. Media workers do not merely receive technology; they appropriate, resist, adapt, and sometimes abandon systems in response to professional norms and managerial expectations. Agency is therefore relational rather than located entirely in an artist or device. Suchman's account of situated human–machine arrangements is helpful because it redirects attention from abstract capacities to practical coordination, while creative-labour scholarship explains why working conditions affect the range of choices available to participants (Suchman, 2012; Hesmondhalgh & Baker, 2011).

Governance is equally central. UNESCO (2021) identifies risks of market concentration, bias, cultural exclusion, and unequal distribution of benefits alongside the possible contributions of AI to cultural expression. Such concerns apply to both AI-generated media and robotic systems, but their practical forms vary: software may raise issues of dataset provenance and editorial control, whereas embodied robots also raise accessibility, safety, participation, and design accountability. The review thus proceeds from a specific conceptual gap: the need to explain how these distinct forms of mediation interact with creative agency and socio-technical conditions.

Sustainable culture adds a normative dimension to that relational analysis. A tool can contribute to a more accessible production process while concentrating intellectual property or technical knowledge in a small number of providers. An institution may celebrate automated preservation of a cultural form without providing the community concerned with meaningful authority over its representation. Similarly, an installation may present human and robotic actions as equal while the human participant possesses little capacity to challenge the system's course. These possibilities indicate that access to advanced technology and equitable participation are distinct outcomes. The framework proposed below therefore treats cultural sustainability as a matter of durable agency, plural representation, and accountable governance rather than equating it with an increase in the quantity of digital cultural artefacts (UNESCO, 2021; Ploin et al., 2022).

## METHODOLOGY

### Design and Review Scope

This study is a critical conceptual literature review, not an experimental investigation, formal critical discourse analysis, or systematic review. The objective is theoretical integration rather than the exhaustive estimation of findings across a defined population of studies. The review combines foundational work on creativity, creative industries, and socio-technical systems with selected research on generative AI, artistic practice, and physically embodied HRI. The manuscript’s original literature provided the starting corpus; targeted identification of directly relevant, later publications was used to strengthen the underrepresented HRI and contemporary AI discussion. The reference list identifies the works on which the synthesis is based.

A conceptual review is particularly appropriate where the central problem concerns incompatible categories rather than an estimate of pooled effects. The available sources include books developing theoretical vocabulary, studies evaluating human interaction with particular technologies, and policy documents expressing normative expectations. These materials cannot be treated as methodologically interchangeable observations. Instead, the review asks what each type of source can legitimately establish and where claims need qualification. The aim is to propose conceptual relationships that can

organise future research: how forms of AI mediation differ, what robotic embodiment adds, and how cultural production conditions influence their consequences. The resulting synthesis should be judged by conceptual clarity, fidelity to the evidence cited, explicit treatment of counterarguments, and the usefulness of its propositions for subsequent empirical inquiry, rather than by the claim of exhaustive coverage.

**Source Selection and Boundaries**

The corpus was developed from the original manuscript's cited literature and subsequent purposive identification of primary studies, theoretical books, scholarly reviews, and institutional policy documents relevant to the two research questions. Sources were selected to clarify: (a) human and computational creativity; (b) applications of AI in cultural production; (c) physically embodied creative robots and HRI; and (d) agency, labour, ethics, and cultural governance. The final synthesis distinguishes peer-reviewed empirical studies, technical prototypes, theoretical arguments, and normative policy recommendations. The selection emphasises conceptually relevant sources rather than a statistically representative sample of publications (Snyder, 2019). The revised reference list contains 24 cited works; this count represents works used in the argument, not the number of records identified or screened through a database search.

For transparency, a structured supplementary search protocol is proposed for completion and author verification before resubmission. It comprises three complementary search streams: (1) ('artificial intelligence' OR 'generative AI' OR 'computational creativity') AND ('creative industries' OR 'creative production' OR 'human-AI co-creation'); (2) ('human-robot interaction' OR 'creative robotics' OR 'robotic art') AND (creativity OR drawing OR performance OR storytelling); and (3) ('artificial intelligence' OR 'creative robotics') AND ('creative labour' OR agency OR ethics OR authorship OR 'cultural diversity'). Searches should be adapted to Scopus, Web of Science, IEEE Xplore, and the ACM Digital Library, with Google Scholar used for supplementary citation tracing. The proposed main window is 2015 to October 2026, supplemented by pre-2015 foundational texts; English-language coverage and publication-type restrictions should be disclosed. The original project did not retain a database search log, dates, screening counts, or independent eligibility decisions, so these procedures are not represented as already completed. This limit on auditability is a feature of the present conceptual review, not evidence of exhaustive coverage.

**Interpretive Thematic Synthesis**

Interpretive thematic synthesis followed a theory-informed, deductive–inductive logic. The two research questions generated sensitising categories concerning creative augmentation, embodied collaboration, creative agency and labour, and ethical governance and cultural sustainability. Sources were then read comparatively for their principal concepts, technological setting, research design, arguments, and limits. In keeping with the general phases described by Braun and Clarke (2006), the process involved familiarisation with claims, categorisation, comparison of relationships, refinement of themes, and construction of a written synthesis. The paper does not claim that a formal multi-coder reflexive thematic analysis or inter-coder reliability procedure occurred; the terms ‘themes’ and ‘synthesis’ denote interpretive categories supported by cited literature (Braun & Clarke, 2021).

An analytical evidence matrix provides a check against category slippage. Each source is distinguished by publication and evidence type, creative or interaction setting, main contribution, and scope limitation; Table 2 summarises illustrative anchors. The critical step was not to count mentions of ideas but to compare what sources can establish: for instance, experimental evidence on short-story evaluation and diversity (Doshi & Hauser, 2024), real-world artistic accounts of human–AI practice (Ploin et al., 2022), direct interactive robotic drawing (Gao et al., 2024), and normative recommendations for equitable adoption (UNESCO, 2021) answer different kinds of questions. Counterarguments and conflicting results were retained where they sharpened interpretation. Claims derived from prototypes

were not generalised to industry-wide outcomes, and the framework's propositions remain explicitly untested.

**Trustworthiness and Limitations**

Analytical credibility was approached through explicit classification of evidence, comparison of divergent findings, checking individual claims against the scope of their sources, and recording limitations in Table 2. The analysis recognises the interpretive influence of critical media and socio-technical perspectives on the selection and grouping of arguments (Braun & Clarke, 2021; Snyder, 2019). Its main limitations are purposive sampling, uneven research coverage across creative sectors, English-language emphasis, the absence of an archived database search and screening log, and the limited number of directly relevant examples of embodied artistic HRI. No inter-coder reliability, formal study-quality scores, quantitative meta-analysis, or causal validation of the proposed framework is claimed. The recommended supplementary search and audit record should be completed before this article is submitted as a fully traceable review.

Researcher interpretation is unavoidable in a conceptual synthesis. Deciding which aspects of artistic agency or cultural sustainability warrant attention reflects theoretical commitments drawn from media studies and socio-technical analysis. To make that stance visible, the paper separates source-level observations from the authors' proposed explanations and specifies the disciplinary and contextual boundaries of each example. Claims that a technical system is capable of producing an output are distinguished from claims that its deployment is ethical, accepted, or economically advantageous. The discussion also considers potentially inconvenient evidence, including collective homogenisation and limits to the effects of robotic storytelling. These precautions improve transparency but do not eliminate selection bias or substitute for an independent second reviewer. The framework should therefore be treated as a defensible proposition awaiting refinement through research on working creative organisations.

## THEMATIC FINDINGS AND CRITICAL DISCUSSION

Four interrelated analytical dimensions address the research questions. They are presented as a critical synthesis of selected literature rather than as statistically generalisable results. Table 1 distinguishes software-only creative technologies from physically embodied applications, while Table 2 makes the evidential basis and limits of selected anchor studies transparent.

**Table 1. Illustrative AI applications and the distinction between software and robotic embodiment**

| Creative setting | AI contribution | Embodiment / interaction | Critical consideration |
|---|---|---|---|
| Music composition | Generates musical phrases, variations, and arrangements; original manuscript discussed AIVA as an example (Briot et al., 2020). | Typically software-based; human–AI editing. | Training data, attribution, stylistic repetition. |
| Visual art and design | Supports image transformations, style variation, and design ideation; original draft discussed DeepArt (Gatys et al., 2015; Yu, 2025). | Usually software-based; iterative selection. | Authorship, aesthetic homogenisation, creative control. |

| Creative setting | AI contribution | Embodiment / interaction | Critical consideration |
|---|---|---|---|
| Writing and screen work | Supports drafts, writing prompts, story alternatives, and preliminary screenplay ideation (Brown et al., 2020; Doshi & Hauser, 2024). | Software-based human–AI exchange. | Reduced diversity, labour and editorial accountability. |
| Robotic drawing | Adds physical strokes in a coordinated artistic task (Gao et al., 2024). | Embodied robot, shared surface, alternating action. | Interpretation of intention, collaboration, responsibility. |
| Social-robot storytelling | Adapts story responses during collaborative interaction (Elgarf et al., 2024). | Embodied social robot with verbal interaction. | Autonomy, interaction design, transfer beyond education. |
| Fashion and product design | Supports visual concepts, pattern exploration, and early prototyping (McIntyre, 2012; Yu, 2025). | Mostly software-led ideation; robotics only where physical fabrication or embodied interactions are evidenced. | Creative ownership, labour, material sustainability, and commercial constraints. |

**AI-Assisted Creative Augmentation: Capacity Is Not Agency**

AI supports creative work most visibly through expanded options: alternative compositions, story prompts, stylistic transformations, and design variants. These affordances can lower technical barriers and diversify a practitioner's immediate repertoire (Briot et al., 2020; Ploin et al., 2022; Yu, 2025). Yet computational generation should not be equated with the complete process of creativity. The system may identify patterns and produce candidate material, while a practitioner defines the problem, interprets cultural appropriateness, evaluates quality, and makes situated aesthetic judgements (Runco, 2023).

These forms of assistance may influence several stages of a production process differently. In early development, generated alternatives can help a practitioner explore an unfamiliar genre or test a possible composition. During production, automation can simplify routine variations, although the work of checking, correcting, and integrating outputs may remain substantial. During evaluation, AI-generated suggestions may be used to compare options, but a machine's apparent fluency does not determine whether the material is culturally appropriate or legally usable. The often-invoked description of the system as a 'partner' must therefore be specified by task. Partnership could mean supplying examples, responding to feedback, assisting technical execution, or sharing a physical action, and each configuration carries different demands for human interpretation. Without these distinctions, claims about collaboration become rhetorically attractive but analytically weak (Ploin et al., 2022; Yu, 2025).

The literature also supplies grounds for critique rather than affirmation alone. Doshi and Hauser (2024) found that access to AI-generated ideas improved average evaluations of individual stories while making outputs more alike. The implication is that efficiency and individual evaluations can improve without increasing cultural variety. This distinction matters for media industries, where a growing volume of readily produced content may coexist with aesthetic convergence. Yu (2025) additionally identifies risks of cognitive overload and overdependence in AI-supported design processes. Accordingly, AI's value should be evaluated not only by output quantity or speed but also by who exercises interpretive control, how distinctiveness is assessed, and whose perspectives are represented. In audiovisual production, the value of machine-generated drafts must similarly be evaluated against

editorial revision, aesthetic continuity, commissioning responsibilities, and contextual sensitivities rather than production speed alone (McIntyre, 2012).

The contrast between creative assistance and dependence also invites a critical media-industries interpretation. Commercial content producers often face incentives for rapid iteration, predictable audience appeal, and reduced production costs. Under such pressures, generated material may be preferred because it is efficient or readily legible rather than because it advances artistic diversity. At the same time, smaller creators may benefit from affordable drafting tools that make experimentation possible without large budgets. The same technology can thus expand opportunities for some participants while reinforcing established templates or uneven bargaining power for others. No single normative verdict follows from the existence of generative capability. Evaluation should address institutional incentives and negotiated use: who defines acceptable outputs, who bears revision costs, whether workers have discretion to refuse a tool, and whether audiences receive meaningful disclosure where necessary (Hesmondhalgh & Baker, 2011; Doshi & Hauser, 2024).

For RQ1, the evidence supports an account of AI as an assistive mediator of ideation, generation, and revision, not an automatic substitute for human artistic agency. Whether a particular tool enhances creative practice depends on task design, expertise, iterative judgement, and the criteria by which creative outcomes are valued. This is also why legacy descriptions of tools such as GPT-3 or image-style transfer should be used as historically situated examples, not as evidence for claims about all contemporary AI systems.

**Embodied Human–Robot Co-Creation: What Physical Interaction Adds**

Creative robotics extends beyond the generation of symbolic or digital outputs. A robot must translate computational decisions into observable movement and interaction with a shared environment. Gao et al. (2024) demonstrate a human–robot portrait-drawing arrangement in which a user and robot alternately add lines to a canvas. The artistic task depends on sequential coordination: the robot's next action is shaped by what the human has already drawn, and the person can observe the material result. Embodied collaboration therefore involves timing, feedback, material affordances, and control of a shared creative surface.

This interaction changes the locus of evaluation from a finished product to the unfolding sequence of contributions. A coordinated drawing can succeed as an interaction even when the final portrait is imperfect; conversely, a technically polished image may be produced without meaningful human influence over the robot's behaviour. Assessing collaboration therefore requires attention to turn-taking, responsiveness, interruption, repair after error, and whether participants understand what the robot can and cannot do. Physical action adds risks that purely symbolic generation does not: a robot may obstruct movement, act unexpectedly near a person, or damage a shared material. These practical features do not negate its creative possibilities, but they mean that a responsible account of robotic co-creation must include usability and safety alongside originality. Existing technical demonstrations illustrate these considerations without resolving how professional creators would integrate them into production schedules (Gao et al., 2024).

Elgarf et al. (2024) provide a contrasting HRI setting: shared storytelling with a social robot. Their reported findings differed between wizard-operated and autonomous robot conditions, warning against the assumption that adding creative dialogue alone guarantees an improvement in participants' creativity. Although these experiments concern children in educational settings rather than creative-industry workers, they illustrate why autonomy, interface design, and interaction context must be specified. A system's apparent creativity is co-produced by software, embodiment, human responses, and the evaluation method.

Human–robot storytelling also demonstrates why research designs matter when interpreting apparently positive results. Elgarf et al. (2024) reported no significant creativity effect in their wizard-

operated condition but found more encouraging differences when children's interaction involved an autonomous creative robot. The contrast does not establish autonomy as a universally superior design principle. The studies differed in implementation, and conclusions remain bounded by participants, measures, and educational tasks. Instead, the comparison alerts creative-industry researchers to the need to describe technical agency precisely. In a gallery, studio, or performance space, a robot's speech and gestures might be automated, scripted, or remotely controlled; audiences could interpret these arrangements differently, and participants' responses might depend on novelty rather than sustained creative value. Evaluating an installation consequently requires observation of its actual interaction practices rather than reliance on a promotional account of machine creativity.

The relevant question is not whether robots reproduce artistic emotion in the abstract, but which creative actions they can share, which decisions remain human, and how interactional responsibility is allocated. Physical co-presence can generate possibilities unavailable in software-only editing, but also introduces constraints involving safety, latency, control interfaces, accessibility, and material resources. For RQ1, these cases establish a meaningful conceptual bridge between AI computation and creative robotics while also exposing the limited evidence for broad industry-wide adoption.

**Creative Agency, Labour, and Authorship: Who Directs and Benefits?**

The term “co-creation” can imply an equal partnership where none exists. Creators may retain authority over goals, selection, and public responsibility even when an AI system produces much of the intermediate material. At the same time, technology developers, commissioners, platforms, and employers shape the choices available to practitioners. McCormack et al. (2019) demonstrate that debates about machine-made art cannot be resolved through output appearance alone; autonomy, authenticity, intention, and authorship require separate examination. Suchman (2012) further cautions against interpreting machine agency without attention to the situated conditions of human–machine action.

The allocation of agency becomes especially complicated when outputs involve many linked acts of selection. A model developer may determine the architecture and permissible inputs; a commissioning organisation may define commercial objectives; a practitioner may choose prompts, interpret responses, and reject unsuitable content; and other workers may edit or physically realise the output. Calling the machine an 'author' does not settle which of these contributions deserve recognition or legal protection.

Likewise, insisting that creativity is exclusively human can obscure the genuine ways automated systems alter available choices and the organisation of work. The more useful questions concern consequential control and responsibility: who can intervene when the system produces inappropriate material, who bears reputational or economic harm, and who decides that the finished result is acceptable? Such distinctions align the discussion with a relational rather than purely technological account of artistic agency (McCormack et al., 2019; Suchman, 2012).

For creative labour, the promise of accelerated production is accompanied by questions about remuneration, skill development, work intensification, and control of intellectual property. Ploin et al. (2022) show that artists adapt techniques and develop new skills in their engagements with machine learning; their evidence does not justify a universal claim that AI removes the need for artists. Hesmondhalgh and Baker (2011) remind us that creative opportunities are unequally distributed and subject to institutional pressures. An ethical assessment therefore asks which tasks are automated, who may refuse automated workflows, whose contributions are acknowledged, and whether new efficiencies are shared with workers.

These considerations are familiar to production studies because creative work is already collaborative and hierarchically organised. Scripts, designs, edits, performances, and soundtracks often undergo multiple stages of review, and creative authority may rest with a producer, client, platform, or commissioner rather than the person who first develops an idea. AI can intensify those tensions by

making intermediate contributions less visible and inviting managers to redefine specialist tasks as routine operations. Alternatively, it can relieve some repetitive duties and allow greater attention to higher-order creative choices. The direction of change must be investigated rather than presumed. Workplace ethnography, interviews, and documentation of revision chains would be useful for tracing who approves AI-assisted outputs, how credit is attributed, and which kinds of labour remain essential after a new tool is introduced (Hesmondhalgh & Baker, 2011; Ploin et al., 2022).

The problem becomes more complex with physical robots. Their visible actions can be mistaken for independently authored artistic decisions, even when humans configure datasets, plan tasks, maintain hardware, and curate results. In a co-drawing installation, meaningful attribution might include the human artist, robotic system designers, and collaborators who establish the interaction rules. Such possibilities are context-dependent; they should not be conflated with settled legal ownership. For RQ2, the central insight is that technical capability does not by itself settle creative authority or distributive fairness.

**Ethical Governance and Cultural Sustainability**

If AI acts as a bridge between cultural production and robotics, governance must operate across the entire chain of human–machine interaction. Concerns include provenance of training materials, consent and attribution, algorithmic bias, cultural stereotypes, responsibility for harm, and the concentration of computational and platform resources. UNESCO (2021) identifies cultural diversity and equitable participation as important considerations in AI governance. These concerns are not secondary technical defects; they influence which styles, languages, traditions, and creators become visible and economically viable.

A meaningful governance response must address the level at which harm or exclusion can occur. At the dataset level, historical inequalities may affect which artistic traditions are represented or misrepresented. At the interface level, default suggestions can constrain how a practitioner imagines possible styles. At the organisational level, opaque procurement contracts may make it difficult to verify provenance or challenge decisions. At the distribution level, platforms and commissioners influence which AI-assisted outputs are promoted, monetised, or attributed. These layers interact, so an isolated disclosure label cannot resolve every problem. In robotic creative settings, the visible actions of a machine can also obscure the humans who designed its behaviours and supplied underlying cultural material. A socio-technical approach requires governance to follow the chain of contributions rather than focusing only on the moment an image, performance, or object is produced (UNESCO, 2021).

Generative systems may appear to democratise access while depending on resource-intensive infrastructures beyond the control of small organisations or independent artists. Meanwhile, robotic installations introduce further questions about who can afford the equipment and who can participate safely and accessibly. Without attention to these conditions, arguments for innovation and cultural preservation risk overlooking inequality and the material costs of technological integration. Cultural sustainability should therefore mean more than the availability of AI tools: it includes pluralism of creative voices, protection of local practices, fair recognition, and long-term institutional capacity.

The language of sustainability should be used carefully. Economic sustainability concerns whether smaller organisations and workers have viable access to tools and fair opportunities to benefit; cultural sustainability concerns representation, participation, and the transmission of creative knowledge; and environmental considerations concern the resources consumed by infrastructure and physical equipment. The present review does not quantify the environmental footprint of particular systems, so it cannot claim that AI or robotics is inherently sustainable or unsustainable. It can nevertheless argue that sustainability cannot be established through technological adoption alone. Organisations deciding whether to commission an AI-supported production should assess practical value alongside infrastructure needs, maintenance, energy requirements, access for disabled participants, and the effects of outsourcing

or automating labour. These questions are more demanding than promotional claims of frictionless innovation, but they align cultural policy with accountable practice (UNESCO, 2021).

These questions should be incorporated into design and commissioning decisions rather than postponed to broad policy recommendations. Relevant practices include documenting data provenance and AI involvement, ensuring meaningful human review, clarifying credit and licensing arrangements, evaluating possible cultural bias, and establishing accessible participation rules in robotic art projects. For RQ2, socio-technical governance is a condition shaping the value and acceptability of AI-assisted and embodied creativity—not an afterthought to technological deployment.

***Table 2*. Selected evidential anchors, contribution and scope limits**

| Source | Evidence type / case | Contribution to argument | Caution in interpretation |
|---|---|---|---|
| Ploin et al. (2022) | Report examining artistic machine-learning practice. | Artists reconfigure skills and creative processes. | Not a study of physical robotics or all sectors. |
| Doshi & Hauser (2024) | Experiment using AI ideas in short-story writing. | Individual benefit can coexist with reduced diversity. | Specific task and experimental context. |
| Gao et al. (2024) | Technical and interactive robotic portrait drawing study. | Physical human–robot co-action and feedback. | Prototype context; no general industry impact. |
| Elgarf et al. (2024) | Two child–robot storytelling studies. | Autonomy and interaction design matter. | Education, not professional creative workplaces. |
| Yu (2025) | Transdisciplinary review of AI in design. | Co-creation entails facilitation and dependence risks. | Conceptual synthesis, not HRI validation. |
| UNESCO (2021) | International normative recommendation. | Cultural plurality and ethics are governance questions. | Policy guidance, not empirical effect measurement. |

## A SOCIO-TECHNICAL FRAMEWORK OF AI-MEDIATED CREATIVE COLLABORATION

The proposed framework distinguishes three interacting analytical dimensions: (1) human creative agency, expressed through intention, evaluation, interpretation, and responsibility; (2) AI mediation, expressed through generative and adaptive computational functions; and (3) robotic embodiment, expressed through material action and reciprocal interaction in shared environments. Creative and cultural outcomes are situated within cross-cutting arrangements of ownership, labour, regulation, cultural diversity, and sustainability (Figure 1). This is a heuristic for comparison across settings, not a linear causal sequence.

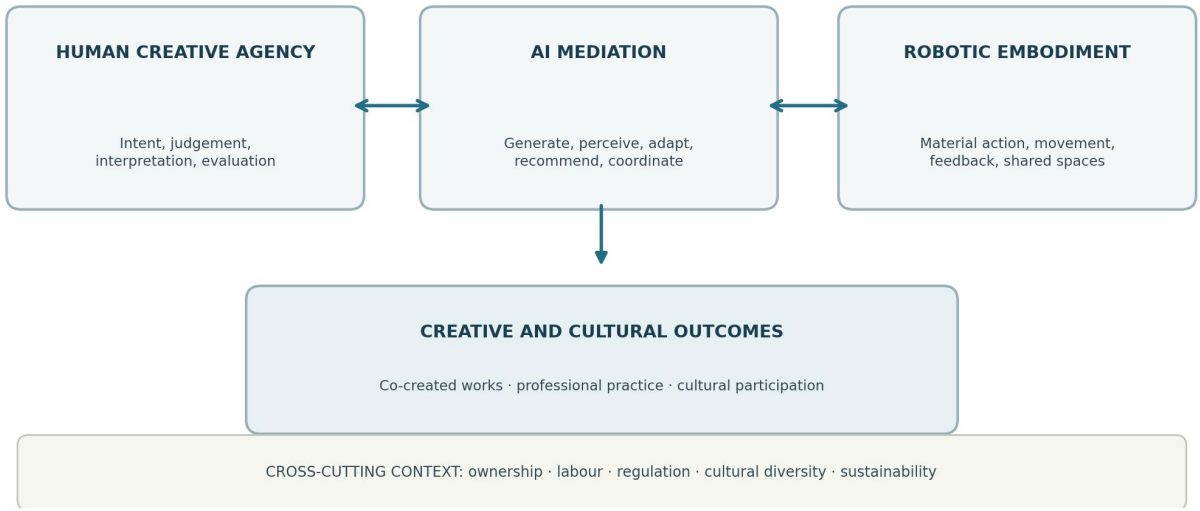



***Figure 1.*** **Proposed socio-technical framework of AI-mediated creative collaboration (authors' conceptual synthesis).**

The framework should be read horizontally as well as vertically. Human participants shape the goals that guide computational activity; AI systems influence the options made visible to participants; and, where robotics is involved, physical feedback can alter the choices available in subsequent moments. Organisations and institutions govern these relationships by defining permissible tasks, allocating budgets, requiring approval, and establishing obligations to creators and audiences. In practice, a single project may move between categories: software-assisted ideation may precede a robotically executed installation, and audience responses to the installation may generate new human artistic decisions. The distinction between software-based and embodied collaboration is thus not a division between industries, but an analytical means of identifying where new kinds of interaction and accountability enter a workflow. This understanding prevents the framework from being mistaken for a prediction that all creative technologies develop towards robotics.

The framework yields three propositions for future investigation. First, creative augmentation is more likely to support meaningful agency when humans retain opportunities to define purposes, contest outputs, and make consequential choices; output fluency alone is insufficient. Second, embodied human–robot creativity differs from software collaboration through physical action, material feedback, and negotiated timing, and must therefore be studied in situ. Third, the distribution of cultural benefits depends on governance and labour conditions that determine access, attribution, compensation, and control. These propositions are analytically plausible but untested by the present review.

The propositions can be examined empirically by observing consequential decisions rather than measuring attitudes alone. For creative augmentation, investigators could document whether people accept, revise, or reject machine suggestions and how they justify those choices. For embodied HRI, recordings could track turn-taking, unexpected actions, task allocation, and material feedback. For cultural governance, investigators could trace intellectual-property arrangements, participation, training burdens, and the distribution of benefits. Such methods permit negative as well as positive evidence: an apparently novel collaboration may be technically impressive yet culturally restrictive or organisationally impractical. The framework is intended to enable these comparisons rather than pre-empt their results.

The proposed framework also clarifies why "bridging" should not be understood as the simple application of generative models to robots. A technical link may connect perception, generation, and

robot control, but a socially meaningful link additionally depends on how participants collaborate, interpret the outcomes, and account for institutional responsibilities. The analytical value of the framework is to make these layers visible in research design and in creative-industry decision-making.

## IMPLICATIONS AND FUTURE RESEARCH

### Implications for Creative Practice and Education

Creative organisations should distinguish tasks suitable for software-based assistance from those requiring embodied interaction. Human-centred commissioning could define the division of creative decisions before adoption, record where AI-generated material enters a workflow, and provide creators with rights to review, revise, and challenge output. Education should integrate computational literacy with aesthetic judgement, ethical reflection, and collaborative production practice, rather than treating prompt proficiency as a substitute for creativity. Interdisciplinary experiments involving artists, HRI researchers, and production workers can expose the possibilities and constraints of actual robotic integration (Ploin et al., 2022; Yu, 2025).

For practitioners, a simple pre-adoption assessment could begin with four questions: 1) What part of the creative process will the system support, and what evidence exists that it performs that task appropriately? 2) Which human participants retain authority to change goals, revise outputs, or stop the interaction? 3) What cultural or intellectual-property material enters the system, and what documentation can realistically be supplied? 4) Finally, what training, safety arrangements, and institutional resources are needed to make the proposed workflow fair and usable? The answers may justify a modest software tool while ruling out a complex robotic installation, or may identify a compelling reason for embodied interaction in public art or participatory performance. The purpose is not to prescribe one level of automation but to connect creative objectives with accountable design choices and documented working conditions (Yu, 2025; UNESCO, 2021).

### Implications for Governance

At the organisational level, practical guidance should address licensing, human attribution, documentation of training-data provenance where available, evaluation of representational bias, and accountability for automated decisions. For robotic creative installations, risk assessments should additionally consider physical safety, accessibility, and participants' understanding of the robot's autonomy. At policy level, incentives should support culturally diverse and smaller creative organisations, rather than equating technological uptake with sustainable growth (UNESCO, 2021). The precise legal duties are jurisdiction-specific and require separate analysis.

Policy should also be responsive to disciplinary and national differences. Copyright and attribution rules are not identical across jurisdictions, while robotics safety standards depend on the physical setting and nature of interaction. A single broad demand for 'ethical AI' therefore gives limited guidance to a small theatre company, a television production unit, or a museum developing an interactive exhibition. Sector organisations could translate general principles into accessible procurement guidance, creator agreements, disclosure procedures, and evaluation checklists while leaving room for local cultural norms and laws. Such measures should distinguish legal duties from voluntary professional standards and should not imply that a conceptual review determines the correct legal status of machine-generated works. Institutions also need opportunities for artists and workers to participate in governance decisions, rather than relying solely on technical vendors to define acceptable conduct (UNESCO, 2021; Hesmondhalgh & Baker, 2011).

**Research Agenda**

Three research directions follow. First, comparative ethnographies of creative workplaces should investigate who uses AI, how creative authority is negotiated, and which forms of labour become more or less visible. Second, longitudinal studies of embodied artistic HRI should examine collaborative control, participant experiences, safety, accessibility, and the creative consequences of different degrees of robotic autonomy. Third, cross-cultural research should assess how datasets, infrastructure, policy, and local artistic traditions shape who can benefit from AI-mediated creativity. Such work could test or revise the framework across sectors and cultural contexts, especially beyond currently prominent technological centres.

Future research should match method to question. Controlled experiments may test effects on narrowly defined creative tasks but must acknowledge the limits of short-term performance measures. Observational HRI studies can examine timing, autonomy, safety, material action, and participant responses in shared spaces. Ethnography of studios, production houses, and cultural organisations can establish how contractual power, approval routines, skills, and labour conditions influence the adoption of AI or robotics. Cross-cultural comparison is needed to test whether the framework applies beyond well-resourced technology centres. Combined evidence would be more informative than extrapolating from isolated prototypes or polished system demonstrations.

## CONCLUSION

AI may connect creative industries and robotics through content generation, adaptive feedback, and physically embodied collaboration. However, these are different modes of creative mediation and should not be treated as interchangeable. The reviewed literature indicates potential benefits for creative exploration while also identifying risks related to homogenisation, dependency, authorship, labour, and cultural inequality. The central contribution of this paper is a socio-technical framework that distinguishes human creative agency, AI mediation, and robotic embodiment, while placing all three within the institutions and cultural conditions that shape creative outcomes. This conceptual framework does not establish that AI improves creativity across all contexts; it provides questions and propositions for empirical investigation and responsible industry practice. Sustainable adoption depends on preserving meaningful human judgement, clarifying responsibility, and supporting a diversity of creative voices.

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## AUTHOR CONTRIBUTIONS

All authors contributed to the study conception and design. Material preparation, data collection, and analysis were performed by all authors.

## CONFLICT OF INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## DATA AVAILABILITY

The data that support the findings of this study are available from the corresponding author upon reasonable request.

## ETHICS STATEMENT

This study did not involve human participants or animals, and ethics approval was not required.

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