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Sensory Museology: Multisensory Exhibitions and Inclusive Design Outcomes

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ABSTRACT

Sensory museology represents an emerging paradigm within contemporary museum practice that reconfigures how exhibitions engage audiences through multisensory, participatory, and inclusive design strategies. This paper examines the extent to which multisensory exhibitions enhance accessibility, learning, emotional engagement, and social inclusion, while critically interrogating their alignment with Universal Design principles. Drawing on case study analysis, participatory design methodologies, and comparative evaluation of exhibition practices, the study explores visual, auditory, tactile, olfactory, and digital mediation strategies across diverse museum contexts. Findings indicate that multisensory approaches can significantly enrich visitor experience, deepen interpretive engagement, and support inclusion for diverse audiences, including persons with disabilities and neurodivergent individuals. However, evidence also highlights persistent tensions, including sensory overload risks, uneven accessibility outcomes, ethical concerns around sensory data use, and infrastructural and budgetary constraints. The study further demonstrates that successful inclusive museology depends not only on technological integration but also on co-creation with stakeholders, iterative design processes, and sensitivity to cultural and embodied differences in perception. Ultimately, sensory museology expands traditional curatorial paradigms by shifting from object-centered display practices to experience-centered, participatory frameworks that reposition museums as spaces of shared sensory knowledge production and democratic cultural engagement.

Keywords: Sensory museology, multisensory exhibitions, inclusive design, Universal Design, and museum accessibility.

INTRODUCTION

Museum practice continually evolves to engage diverse audiences and connect people with the arts, culture, and heritage that shape their lives [1]. Sensory museology an emergent paradigm situated within social museology advances this discourse by questioning how sensory engagement promotes inclusivity, accessibility, and presence in exhibitions [1, 2]. Research framing and questions illuminate diverse definitions of multisensory engagement, the contested nature of multisensory experience as a catalyst for learning, and the conceptual proximity of the theory to the principles of Universal Design [2]. Collectively, these inquiries seek to understand the extent to which multisensory museological interventions increase rather than reduce barriers; whether and how multisensory engagement promotes learning, emotional connection, and critical deliberation on socio-political issues; and the extent to which the practice aligns with or transcends established definitions of universal design it the arts[3].

Conceptual Framework: Multisensory Experience and Accessibility

Inclusion and accessibility constitute significant challenges for museums throughout the world. A crucial starting point for any analysis of these issues is the strict definition of accessibility established in the sociological literature: a design is accessible if and only if it is usable by all human beings [1]. The UN Convention on the Rights of Persons with Disabilities explicitly establishes this principle; following the Convention, the Lisbon Declaration highlights the importance of Universal Design in addressing barriers to participation [3]. Also significant in this

context are the latest developments in the Universal Design framework itself. These developments coalesce around the notion of "inclusive design," emphasising that designs intended to be "accessible for all" must choose additional features that mitigate the shortcomings of dominating senses that may impede participation by the members of more deprived populations [1]. Multisensory engagement in museological exhibitions benefits learning, memory and inclusion, all recognized as components of accessibility [2]. However, despite the predominance of multisensory interventions in exhibition spaces and the broad availability of implementation guides, no concrete evidence proves that such interventions indeed augment accessibility; on the contrary, an opposing body of literature illustrates detrimental effects resulting from interference among the many sensory modalities involved[2]. Moreover, the ethical issues at stake become extremely sensitive if neglected during the design process. Addressing existing disparities in access to multisensory perception can be justifiable only when the presumed benefits outweigh the added risk of widening the gap further by overloading the already privileged modalities involved [1].

Methods and Methodologies for Inclusive Exhibition Design

The research employs a case-study design situated at the intersection of exhibition design and accessibility, with a focus on multisensory interfaces that engage diverse perceptual modalities [3]. Three targeted evaluations investigate design strategies for including users with vision loss in public outreach activities. The principal methods encompass participatory workshops and the systematic analysis of exhibitions and other analogous installations [3]. Stakeholders such as visitors, educators, curators, researchers, and organisations involved in facilitating access have contributed their insights through observation, interviews, co-design dialogues, and collaborative feedback [4]. Co-design sessions emphasising rapid ideation, hands-on prototyping, and iterative input from users affected by the proposed strategies shape the design process and enable all involved parties to articulate and further develop their own approaches[4].Multisensory exhibition design engages alluding multimodal outreach to enrich educational opportunities and strengthen connectively between collections and the public. The selection of relevant interpretation strategies represents a significant design consideration, with modes such as vis-à-vis-oral or oral-olfactory typically complementing a primary channel rather than serving as alternatives [2]. Basic specifications for selected strategies, the broad framework underpinning the installation, and preliminary design concepts are communicated to the participant at each session; installation-specific information thus remains open to adjustment by either facilitators or audience members [3, 4].

Case Studies in Multisensory Museology

Case Study A considers the Balat Museum's braille and colour description system and textual applications in the Serões exhibition of the Museu da Maré. The exhibition's low-tech design, complemented by ongoing projects establishing comparable systems in other institutions, is discussed against the background of the widespread adoption of digital media in inclusive and multisensory museology [5]. In Case Study B, the design of the Permanent Exhibition Hall at the Museum of Contemporary Art of São Paulo uses several complementary scent strategies to mediate works exhibited in the space, while the Travessias exhibition at the Museum of Image and Sound features digital mediation tools that enable articulation between digital moving images and colonial visuality, further engaging these dynamics through sound [5]. Digital mediation and olfactory engagement are analysed along with the complementary datum that design-sensitive mediators do not exhibit significant audience-entirety uptake [4]. Case Study C focuses on resources developed for the Contemporary Art and Multisensory Practices exhibition at the Museum of Modern Art. Visitors are invited to share perceptions of curated works in a variety of media using both tactile and digital records, with the intermediary noting that manuscript submissions remain predominant despite the clear availability of multimedia alternatives [5]. The exhibition illustrates an inclusive-art proposition in which original proposals for diverse bodies coexist yet remain attached to specific works, allowing contemporary-visual-modes only to flourish via digital-mediation paths independently elaborated. [1].

Case Study A: Visual, Auditory, and Tactile Interfaces

The samples were taken in an exhibition space with five artworks. For each case studied, a multi-sensory strategy was acknowledged to address a particular challenge and a specific level of engagement was sought [4]. Multi-sensory strategies had mostly been applied to provide content directly or to translate the exhibition's theme indirectly. All strategies specified the artwork clearly perceived visually in correspondence with articulated content [4]. Integrating tactile, audio, and visual interfaces into the same museum exhibition is generally not straightforward, as multiple questions arise, including how to present one piece of art at the same time, how to convey the original artwork through each of the channels, and which components acquired added value when they were combined [4]. Depending on the level of discourse, having several multi-sensory strategies in parallel risked causing set confusion. User experience research suggested prioritising towards parsimony rather than precision.

The overall challenge concerned accessibility, and several approaches could frame part of the spectrum towards that particular audience [4]. The extended set of complementary interactions allowed a voiceable multi-sensory exposition, since no other system generated a comparable level of pervasive dialogue. Referring to a digital

painting with the title "Los Danzantes de Huitziliztli: an Ancient Tribute Book." tactile dimensions were incorporated to enable chart recognition through diverse explorative paths and encourage identification of the depicted species; an expanded audio description fitted within speaker storage constraints; and multi-sensory desks, the combination of materials intended to reproduce the fragrance in the pre-Hispanic epicenter of Cuicatlán[5]. The colour palette and additional interpretation followed the electronic-version carton principles [5]. Attraction through tapping in videos and hold on still images enhanced dramatically the focus on moving pictures and large fields of light during the parlor conferencing. Provision of captions and the urge to explore the on-demand screening further eased attention [1]

Case Study B: Olfactory Engagement and Inclusive Wayfinding

Museums have long fostered multisensory engagement through touch, sound, scent, and temperature. Historically, tactile interaction with artifacts enabled direct sensory experiences that are increasingly rare in contemporary exhibitions, even as multisensory engagement has regained prominence in curatorial discourse [4]. Strategies such as open, interactive, and participatory exhibitions; expanded object handling; and co-creation further the dialogue while pursuing inclusion and accessibility [1]. A case study of Olfactory Engagement and Inclusive Wayfinding examines the role of scent as an inclusive navigational aid and its potential to convey multisensory meanings for artworks. During co-design at the Art Gallery of Ontario, scent strategies complemented existing installations of artwork and supporting material [4]. Co-design with members of the Réseau d'échange et d'amitié pour la culture et la scolarité (R.A.C.) identified artworks deserving scent and additional scents for a rotating carousel approach. In further co-design sessions with Art Gallery of Ontario collaborators, a prototype exhibit featured three scented artworks opportunities for additional sensory appreciation beyond visual examinations of the artworks [5]. Individual co-design of digital scent artworks through physical and software interfaces illuminated the embodiment of scent as both a diffuse medium and a carrier of multisensory experience. Educational interactions highlighted the construction of relational narratives through scents, furnishings, colours, and sounds, extending these stories at the personal level or to wider community contexts [4].

Case Study C: Interactive Digital Mediation for Diverse Audiences

Interactive digital mediation aimed at diverse audiences constitutes a further avenue explored within the research programme [4]. Digital technologies afford unprecedented possibilities for the design of accessible exhibition interfaces, and are capable of enhancing participation and agency in ways not offered by traditional artefacts. Maintaining an additional dynamic interactivity alongside cross-sensory language, the case study investigates the use of touch screens in three temporary exhibitions at the Art Gallery of Ontario co-designed with artist-educator Sheila K. Johnson and secondary school students [4]. The interface media included visual animations, video, illustrations, and text utilising sound, time, and motion, thereby further extending the multisensory approach.

The physical, social, and personal barriers to accessing museum exhibitions identified by disabled users frequently pertain to information delivery and engagement, reflected in the design principles for accessible exhibits [4]. Digital technologies have been discussed in relation to visitor participation, support, and experience; nevertheless, participation and inclusion for diverse audiences are complemented by low-threshold access to relevant content and opportunities for engagement [5]. Interactivity is viewed as a prerequisite in certain outlooks, remaining a critical feature in the context of enabling touch and multi-sensory means of expression. Touch remains a significant avenue for imparting content in environments where looking is restricted, or where interventions are mediated through the setting, while interactivity may be actively sought in selected contexts rather than pre-scribed as an automatic part of the design [1].

Evaluation of Inclusive Outcomes in Exhibitions

The physical and behavioral perspectives of visitors, educators, researchers, and curators illuminate the multifaceted impacts of multisensory approaches and highlight the barriers and enablers experienced throughout ongoing engagements [4]. Stakeholders across the spectrum note that museum visits tend to elicit curiosity, evoke remembrance, stimulate observations, and provoke questions, along with the sharing of culture, knowledge, and culture. The enactment, processing, and investigation of scents and explorations of haptic and multisensory elements, coupled with freely accessible digital content, increasingly support these intentions [5]. Various international standards, frameworks, and checklists identify accessibility as the design principle most frequently addressed. Different museums assess compliance along dimensions such as information, interaction, location, navigation, physical, and visit [4]. The varying levels of accessibility experienced during visits to museums and exhibitions elsewhere often limit exploration of multisensory dimensions. The deliberation of multisensory exhibits frequently arises when balancing the need for a physical visit with the desire for engagement after a visit. In addition to Globalmente, numerous engagement actions foster social interaction, exchange of ideas, and participation in democracy, visibly enriching the content of learning [1]. Others support several sensorial pathways, cognitive processes, and abilities, allowing diverse routes of access to collections related to visual arts. Assistive aids have also been proposed for selective engagements, offering further extensions beyond current accessibility [4]. The exhibition's core mission was to achieve intellectual access through inclusive, multi-sensory

communications. Participants identified milestones including a multi-sensory exhibition accessible to all visitors, inclusive wall panels and labels, large-print and Braille brochures, gallery way-finding, interpretive audio, cost-effective audio equipment, and visitor assistance [4]. Co-creation sessions linked design concepts to curatorial themes, emphasizing tactile objects and diverse materials to demonstrate additive manufacturing. Final design and curation involved hands-on activities and feedback from sight loss participants, using physical setups and drawings to refine the inclusive approach [5]. Multisensory museum experiences are more educational, memorable, and meaningful for diverse audiences, adding value and breaking barriers to inclusion. Historically, early museums encouraged multimodal interaction, with visitors touching, smelling, and tasting artifacts, but over time, the focus shifted mainly to visual protection of artworks. Today, including multiple modalities in exhibits is emerging but remains limited. The research aims to explore how multisensory techniques can make art accessible and create new art forms, addressing questions about translating visual art into other sensory modes and their impact [4]. A graduate course on multisensory experiences, involving collaboration between the Art Gallery of Ontario and OCAD University, studied inclusive design practices through observation and interviews with students, instructors, stakeholders including visually impaired community members and museum professionals. Students employed participatory design, involving users in the creation process rather than designing for them [5].

Stakeholder Perspectives

Visitors encountered first-hand, the challenges and barriers experienced by others. Within the limited scope of the research, implementation and exhibition design embraced these principles, enabling participants to engage with the process while still gaining relevant insights [5]. Such approaches illuminate the ways in which a wider set of inputs could supplement their multi-sensory exhibitions [4]. A multi-sensory installation at the University of Alberta Museum developed through co-creation with multiple stakeholders and a range of activities the team pictured an exhibition describing the use of imaging, sound, and touch differed widely in ambition, complexity, and outcome. The September 2017 opening attracted visitors of diverse age and ability [3]. The emphasis on making the broader experience more relevant resulted in positive dialogue with stakeholders, but there remained unevenness to exhibition preparation and support [2]. The wider collaboration opened up possibilities and pointed to under-explored aspects in one-off guiding frameworks that might otherwise have become entrenched. Overall, these participatory initiatives illustrate a supporting mode central to a user experience, benefiting both the general and the highly constrained [4]. A multi-sensory initiative that investigated the barriers to learning experienced by people with sight loss through co-design between curators, educators, a designer, and those affected sought to expand its scope and relevance [1]. The project approached the exhibition, which introduced a previously inaccessible audio-description film, with the question: "How can one ensure that the information, knowledge, and learning is communicable to individuals who remain sighted but who nevertheless encounter visual impairments throughout their daily lives?" Attention turned from a high-concept multi-sensory exhibition adopting the sensory attributes of the exhibited artworks for a deeply embedded engagement towards offering guidance on auxiliary communications for additional audiences [2]. The provision of basic material accompanying programmes, classes, and public talks directed towards those able to attend but unable to see swiftly evolved into an enterprise homing in on practices suitable for visual-art exhibitions more generally. Ultimately, exploitation of a multi-sensory approach for extra-art content tailored to art events has begun to take shape, leading to a parallel exploration of how the arts beyond the visual might stimulate effective communication around visual-art content [2].

Accessibility Standards and Metrics

Various externally imposed accessibility standards and metrics apply to museum activities. The Web Content Accessibility Guidelines (WCAG) inform digital accessibility at exhibitions [4]. The Accessibility Europe standard defines a range of indicators, instruments, and techniques to increase accessibility and management of built environments [3]. The European Commission proposes survey-based indicators such as the number of museums directly accessible to people with disabilities [1]. Compliance with these measures remains patchy [5]. Within the museum domain, numerous distinct observatories, tools, and standards focus on guidelines, analysis, and metrics for accessibility. The International Organisation for Standardization (ISO) offers wide-ranging accessibility standards [4]. Expert, participatory, and self-evaluation approaches support exhibition-specific diagnosis of access and usability. Accessibility observatories map needs, prevalent challenges, and support resources across Europe. The dynamic association through the European Commission promotes knowledge exchange when implementing, monitoring, measuring, and evaluating access to cultural policies [5]. Research indicates a clear need to define precise evaluation parameters, tools, and standards specific to multisensory exhibition modalities. Among the excitement surrounding multisensory engagement, implementation and assessment remain challenging [4]. Furthermore, identifying audience engagement with spatial and temporal modalities presents additional complexity. Standardized measurement tools for conventional exhibitions exist even though the establishment of metrics remains elusive [5].

Impact on Learning, Engagement, and Inclusion

Numerous accounts testify to the emergence of multisensory engagement as a prominent approach across cultural environments worldwide [5]. Multiple participants across multiple contexts have reported significant learning gains and higher levels of observational engagement during multisensory interventions compared to traditional practices. A rigorous investigation of the pedagogical impact of multisensory experiences in education indicates broadly beneficial effects on knowledge retention, motivation, community-building, learning journeys, acquisition of new skills, and development of pro-social behaviors [4]. Further studies across museums, exhibitions, creative learning activities, performances, film screenings, and galleries corroborate the crucial role of intense, vibrant, colourful, physical, colourful, imaginative, oral, playful, and multisensory experiences for a greater number of museum visitors, expanded accessibility for multi-ability audiences, attraction of larger youth audiences, and elimination of barriers limiting participation[3]. Visually impaired individuals have reported memories of olfactory triggers associated with key learning and life experiences dating back many decades. Accounts from both neurotypical and neurodivergent children and adults indicate that further enhancing multisensory outputs within existing review-ready or exhibition-ready installations would amplify and bless museums with richer and more meaningful sessions, attention, learning, involvement, observation, questioning, dialogue, play-sharing, and engagement in short, with more love[2]. A series of institutional internal and external reports attests to the deep-seated role of evocative stories and sensory stimuli within museum collections development, research, and access policies, initiatives relating to moving beyond conventional sensory systems, the fundamental importance of multisensory access, and the intensity of multisensory experience at every level for both objects and audience involvement [3]. Contemporary and historical accounts highlight the tendency among many children, young people, and adults to explore artworks through multiple senses including touch, smell, and taste; the vital function played by and the ever-greater urgency of addressing public demand for multisensory experiences grounded in social justice, ethics, rights, access, equity, and inclusion; and the extent of investment in prototyping during the development of multisensory workshops, outreach, and broader-exhibition formats, capturing attention, exploring desire lines, nurturing co-curation, and eliciting deep co-design engagement exceeds that dedicated to the archival review and retrospective study of multisensory patterns among historical works of the same genre[4]. Such iterations reveal emergent systemic groundings favouring broader multisensory exploration of museum collections [5]. Consequently, beyond the broad exploratory multimedial, layers-supporting hero-accessible maximum-evocative-positions and transformational-well-cared-for revitalization engagements already in progress, the current situation, mirrored at external levels, invites, enthuses, petitions, and encourages launching a parallel stream encompassing the still wider museum-of-the-museum multisensory dimension favouring historical access and presently absent from the agenda[5].

Design Principles for Inclusive Multisensory Exhibits

Multisensory engagement constitutes an effective strategy for promoting inclusion and broadening access to information, experiences, and learning across the spectrum of individual abilities [1]. Although links between multisensory exhibition design and improvements in accessibility, inclusion, and engagement have been noted, design efforts often prioritize only a subset of the relevant human senses [2]. Consequently, certain audiences, including neurodivergent individuals, people with disabilities, and anyone, nonetheless remain underserved. Design guidelines drawn from art museum collaborators and case studies undertaken within diverse cultural institutions support the application of multisensory engagement in conjunction with participatory, iterative approaches aimed specifically at inclusive exhibition strategies [3]. The guidelines specified below expand the principles of Universal Design in consideration of the diverse profiles established by the Multi-Sensory Museum survey and take a broader approach than general accessibility recommendations by addressing engagement with all the senses [1]. Expanding horizons rather than restricting options encourages a fuller exploration of available possibilities such as sound, taste, and olfaction. The proposed framework thus recognizes the two complementary goals of calibrating the intensity of sensory elements to accommodate individual preferences and the inherent value of personal agency. Flexibility and customization options further illustrate the potential for personalized multisensory interventions[3].

Universal Design and Beyond

Universal Design provides a solid foundation for the construction of multisensory exhibitions, yet additional design principles are required to enhance outreach to, and usability by, individuals with a range of sensory profiles and preferences [3]. At the United Nations Educational, Scientific and Cultural Organization (UNESCO) World Conference on Arts Education in 2006, a call for sensitivity towards different cultural expressions and appreciation of divergent social contexts underscored the need to extend such frameworks [1]. Such frameworks are of particular value in the contemporary environment, where wholesale personalisation may facilitate engagement, but risk compromising ethical standards of universal access [3]. Exhibition development and interactivity may incorporate a wide range of approaches that include, for example, calibration protocols, configurators that govern the capability and extent of interactive design, adjustable interfaces, user-defined algorithms, and reminder

systems [4]. Sensory pathways, defined as systematic applications of sensory materials to spatial structures, configurations or environments [4], which connect galleries with assembly points, amenities and service areas, may further enhance visitor experiences and building efficiencies yet are commonly overlooked, especially in historic or UNESCO-designated buildings for which architectural design cannot be modified [5]. In certain settings, educational programmes and experiences to create knowledge may deviate from the exhibit pathway, thereby also offering the possibility of connecting sensory experience with other elements of the journey (Hein, 1998) that remain independently accessible. Such additional accessibility considerations distinguish various user typologies defined by distinctive, valuable interests in the subject matter yet from whom concern for humanistic or ethical inclusion may not routinely arise within the design cycle [5].

Sensory Calibration and Personalization

Inclusive and democratic interaction with museums requires the practice of making exhibition experiences more easily assimilable for all, notably for those who are sighted and those who are not. Multisensory or cross-modal media help overcome "visual bias" [4], yet such means remain underutilized. Prospects for wider adoption, however, have emerged through the establishment of exploratory, collaborative principles and processes [1]. Extending the principles of Universal Design has proven conducive to accessibility and inclusivity in several design practices, notably information, architecture, curriculum, exhibit, and interaction design [2]. Multisensory experience remains notoriously difficult to consider in displays of artifacts that perch on the verge of art, such as are found in science museums. It also presents challenges in archives and means of communication that seek to remain faithful to their source through reproduction [3]. Nevertheless, extending the computing paradigm from the, by now, ubiquitous "touch" technique to systematic consideration of multisensory calibration, personalization, and automation across multimodal channels and affordances appears tractable [4]. This approach enables each exhibit unit to be configured both at design time and at runtime, allowing the experience of the same unit to be adjusted to various settings and simultaneously to most individual preferences [5]. Moreover, building on established assistance for the visually impaired would enable the exhibition to remain fully compliant with Universal Design even at calibration time, while further enhancing the visiting experience [5].

Materiality, Safety, and Comfort

Exhibit material choices stem from pedagogical aims and are critical to user safety, product integrity, and overall well-being: unusual objects may dominate personal space, highly textured surfaces can impede safe articulation, disallowed materials attract unwanted attention, and changes in scale can elicit discomfort [4]. Consistent with Universal Design and spatial accessibility standards, exhibition design benefits but does not require complete separation of interfaces, permits ergonomic approaches (e.g., height and position) that complement rather than solely dictate exhibit consumption, and offers familiar placement and affordance without diminishing agency [2]. Transition corridors can assist stepwise exploration of distinct thematic dimensions (i.e., materiality, audience, atmosphere, sensory channels, language) while inviting multiple simultaneous engagements ranging from site-specific to personal [2].

Implementation Challenges and Best Practices

Exhibition Accessibility accessible must not be understood as synonymous with generic accessibility. Indeed, what is presented as being "accessible" or "inclusive" for individuals with disabilities may instead reproduce exclusion [3]. example, tactile content may only feature haptic surfaces, or braille that represent profession, even though where universal design prevents marginalisation. co-creating across multiple users who also have diverse other backgrounds race, nationality, sex, age, social class, or culture adds another critical plateau, the world's richest dimension, that warrants articulation of the emerging principles sauna and turkish bath[3]. Chad and other countries have made enduring strides towards offering all-disability sporting events home to all participating. Multi-sensory exhibition generation example the Hong Kong Museum of History. Exploratory encounter Iris Murdoch's first novel Under the Net. Murdoch. Mu-though, accompanied coeval operatic film Olga, profoundly discapable European archglass individuality, and challenge triage [1].

Collaboration across Disciplines

The museological design process often comprises several stages initial conception, prototyping and testing, final production, and ongoing refinement [4]. These stages, however, are not necessarily linear, nor are they similarly undertaken by all participating partners. Designers may not be present at the outset, while ideas may continue to evolve following formal completion [2]. Depending on the specifics of a given project, the number and nature of partners involved may differ. Clarity about workflows and governance structures can thus facilitate better collaboration across disciplines [4]. Co-creative processes, in which representatives of diverse stakeholder groups collaborate on exhibit design throughout the whole cycle, can improve outcomes considerably [2]. Such processes are beneficial in their own right, but they also enhance collaboration by fostering empathy and mutual understanding. The focus of the research was to explore the principles and practices of multisensory museum exhibition design for people with different abilities [1]. A continued partnership between the Art Gallery of Ontario and OCAD University enabled students to collaborate with stakeholders with disabilities and

professionals across disciplines. Participatory design methods and approaches guided the development of inclusive multisensory and cross-modal artworks, as well as educational programming for temporary exhibitions [1].

Budgeting, Maintenance, and Sustainability

Multisensory exhibitions often entail high implementation costs that fall outside the typical budgets available for temporary exhibitions in many facilities [4]. Many institutions will seek funding from external sources, such as grants or corporate sponsorships [2]. The existence of specific grants allocated to accessibility and inclusion initiatives can simplify this process. Budgets should clearly specify ongoing operational or maintenance costs. Simple operation and maintenance protocols facilitate the realization of inclusive and multisensory content and have a positive impact on learning and engagement while avoiding expenditure of valuable financial resources and the diversion of curatorial or facilitation attention to the upkeep of the exhibition[3].

Ethical Considerations in Sensory Data and Privacy

The focus on increasing inclusivity may introduce ethical concerns during the design and implementation of multisensory exhibitions [3]. Attention is drawn to issues surrounding the collection of sensory data from users to inform usability and accessibility improvements (e.g., types and levels of engagement preferred, and participant pupil dilation) and the potential challenges that arise when consent, anonymization, and rights management systems are not sufficiently robust[4].The extent of sensory stimulus engagement varies significantly between individuals and specific groups, influencing not only the type of multimedia a person is best suited for, but also the overall engagement level with a given exhibit. For instance, an individual with blindness who does not receive tactile feedback via a touchscreen may not be encouraged to engage in other parts of the exhibit, and so forth [5]. When exhibition designers began developing multisensory exhibits, the intent was to engage a multiple set of media channels within the framework of memory, perception, semantics, and cognition associated with sense awareness [5]. Developing a supporting philosophy allowed them to seek partnerships with external groups, and some of the pilot implementations of multisensory systems employed indirect characterizations of human activity in combination with other dataset types to garner specific user interest feedback [1].

Future Directions in Sensory Museology

Museums around the globe continue to confront new challenges and to seek innovative solutions. Digesting the wave of health restrictions related to the COVID-19 outbreak while keeping the visitors' health as the main priority, many institutions focus on adoption of new rules for gathering tours and interactions [7]. Even though many artworks, conferences, projects and travelling kindness were delayed in universities and museum field, the necessity for improvisation in many domains which includes online attempts for exhibitions previewing, slow-insertion of affordable pricing for a greater access to collections and opening the collection for software realizations have also been seen. Multisensory approaches remain theoretically, pragmatically and ethically relevant to museology and, in particular, to the exploration of non-visual presentations of collections [8]. In the work with local museums, the relevant project action has been clearly identified to respond not only on private sectors during periods of restrictions but, more importantly, on the need of abatement of invisibility streams from the digital sphere. Sharing the experience has been highlighted in recognition of relevant work produced in that domain to accompany the practice by sharing potential contacts for further articulation of prototype solutions toward audiovisual inner memory evaluation gathered together with multiple visual collections visiting [9]. Publications on the subject of multisensory solution knowledge and explorations carried across different sector becomes essential owing to the local priority for identifying unconsidered contemporary collections, which have been getting, in regards to relevant publications, broader. Information containing multisensory-related projects dealing objects or collections via designated research centers hardly exists nowadays while still being archivably present in museum portfolios, boosting up the taboo of contemporary unconsidered collections for art investigators and other makers [10].

CONCLUSION

Sensory museology is reshaping contemporary museum practice by challenging the dominance of purely visual modes of exhibition and advancing more inclusive, embodied, and participatory approaches to cultural engagement. The analysis demonstrates that multisensory exhibitions, through the integration of tactile, auditory, olfactory, and digital elements, can enhance accessibility, deepen interpretation, and foster stronger emotional and cognitive connections with collections. However, the findings also reveal that multisensory design is not inherently inclusive. Without careful calibration, such interventions may introduce sensory overload, reinforce existing inequalities in access, or fail to meet the needs of diverse audiences, particularly those with disabilities or neurodivergent conditions. This underscores the importance of aligning multisensory strategies with Universal Design principles while extending them through adaptive, user-centered, and co-creative methodologies. The study further highlights that effective implementation depends on interdisciplinary collaboration, sustained stakeholder engagement, and robust ethical frameworks, particularly regarding data use, consent, and representation. Financial limitations, maintenance demands, and uneven institutional capacity also remain significant barriers to widespread adoption. In conclusion, sensory museology offers a transformative but complex

pathway for museums seeking to become more inclusive and socially responsive. Its future development will depend on balancing innovation with ethical responsibility, ensuring that multisensory engagement expands not restricts equitable access to cultural heritage.

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