

Research Article

Alice Entwistle*, Inga Burrows, Fiona Carroll, Nathan Thomas, Mark Ware,
Gareth Loudon

Affect and Dialogue in Collaborative Cross-Disciplinary Research: Developing Interactive Public Art on Cardiff Bay Barrage

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Abstract: Where Cartesian philosophy distinguishes the perceiving and perceptual mind from the body, phenomenology constitutes the experiential/experiencing body as the subject, giving rise to the *affective* potential of art. An immersive world of digital connections, smart cities and the Internet of Everything dramatises the centrality of relationship, the intertwining of Self and Other, in the lived environments of human experience. This article addresses the contextual, disciplinary and practical challenges encountered in developing an ambitious interactive public art project embedding SMART technology on the coastal fringes of Cardiff, the capital city of Wales (UK). It examines the processes and problems involved in delivering a stimulating aesthetic experience in and on a complex site, for a complex audience profile. It traces, in particular, the dependence of a multi-disciplinary project team on the theoretical and practical effects of *affect* in their ongoing effort to produce engaging, provocative, socially inclusive interactive public art, in and through human-centred design techniques.

Keywords: interactive public art, site-specificity, affect, human-centred design, social disability, social inclusion

Prelude

If every *thing* has an aesthetic dimension, then so does every *experience* of every thing (Berleant 11, emphases original).

In an immersive world of digital connections, smart cities and the Internet of Everything (IoE), “Technology . . . makes explicit the degree to which we are defined and anticipated by others: the ways in which our ideas and identities do not simply belong to us, but are part of a larger human ebb and flow” (Chatfield). This article examines the contextual, disciplinary and practical challenges encountered in developing an ambitious interactive public art project embedding SMART technology on the coastal fringes of Cardiff, the capital city of Wales (UK).

According to Nicholas Bourriaud, “artistic activity is a game, whose forms, patterns functions develop and evolve according to periods and social contexts” (11). Located in an under-used public space which project partners seek to refurbish and transform, “So Much Depends” is intended to be consumed as *public* art. Defined by Claire Doherty as “a variety of forms and approaches that engage with the sites and situations of the public realm, *public* art seems (generically) bound to make that ‘game’ as collectively available as its

*Corresponding author: Alice Entwistle, University of South Wales, Pontypridd, South Wales, United Kingdom,
E-mail: alice.entwistle@southwales.ac.uk

Inga Burrows, Nathan Thomas, Mark Ware, University of South Wales (UK)

Fiona Carroll, University of the West of England (UK)

Gareth Loudon, Cardiff Metropolitan University

name promises; to require of itself some degree of social inclusivity” (13). Certainly, citing Lynn Froggett, Doherty makes clear that the aesthetic interest in “raising questions about the world in which we live,” cannot be considered “subordinate to other social agendas” (14, 15). Interested in what Christine Tohme calls the “seepage between the artistic and the civic” (Doherty 122), a team of researchers working in plastic and participatory practice, informatics, human-centred design and textual aesthetics, aims to develop technologically-enabled public art embedding inclusivity as (at once) self-sustaining aesthetic outcome, virtuous social practice and research challenge.

Our title “So Much Depends” comes from a phrase found in Virginia Woolf’s modernist novel *The Lighthouse*: “so much depends, she thought, upon distance” (177). The words represent our guiding conviction: that public art be defined by and judged on grounds of (social) inclusivity as much as aesthetics; that any aesthetic experience constructing itself as “public” should understand itself as a traversal of, or an attempt to traverse, the many kinds of socio-cultural distance layered and enacted in any public space. That public art should seek to reward anyone encountering it, regardless of age, physical (or cognitive) functionality, or cultural background. The research team aims to demonstrate the capacity of a *technologically-enhanced* aesthetic to close the many kinds of “distance” separating and linking Self to/from Other. The cultural-political and regulatory complex of Wales provides the policy-driven backbone for a project which retraces certain kinds of social exclusion, specifically creative-aesthetic ones, to assumptions about bodily and cognitive “norms.” Harnessing the dynamic relational energies of “affect,” the project aims to explore how established models of human-centred design might be deployed, with IoE and Smart technology, to mitigate social exclusivity in public art.

This account begins with a brief summary of the ambitious technologized material objectives the project is working to realize, before outlining (first) the intersecting aesthetic, geo-historical, and socio-political contexts (including site-specific creativity, the project’s site-environment, Virginia Woolf, and inclusive policy-making in Wales) and (secondly) some key theoretical concepts—aesthetic engagement, “affect” and the “social model” of disability—which justify those intentions. A central section will outline the dialogic rationale for and character of the aesthetic experience which the artworks of “So Much Depends” will be designed (separately and together) to catalyse and enable in a broad spectrum of users; the next will explain how the team plans to engineer an appropriately-tuned, appropriately *inclusive* aesthetic visitor-experience, before detailing the human centred R&D process and technology on which all other outcomes will depend. The article will conclude by setting out some of the challenges involved in maintaining traction on the project, reading the principles and processes of affect theory dialogically back into the team’s own collaborative research process and practice.

“So Much Depends” envisages an aesthetic experience which is multiple and intersects in more than one way. Arranged over a site almost half a kilometre from end to end, the whole work will comprise several separate material elements, scattered along its length. Encountered one by one, in whichever order the visitor chooses, together they will comprise a materio-sensory journey through the site, in which the experiencing body is invited to interact with any plastic, linguistic, digital and virtual affects which the artworks make available. A sonic weather vane, its cardinal points replaced by the six letters of the first two words of the project (“so much”), registers changes of wind direction and force by changing note; a responsive pressure-activated pathway spelling out “depends” in Morse code symbols leads to a voice-activated bench embedded with LED technology inscribing, like the embossed (Welsh and English) braille text which runs round its exterior, “upon”; and a giant windsock, its pole embedding incised and embossed text versions of the word “distance” in as many of Cardiff’s different languages as it can accommodate.

Human centred design (HCD) is widely understood as a design process “based upon an explicit understanding of users, tasks and environments,” where “users are involved throughout design and development” (ISO 9241-210:2010). Drawing on established HCD methods, the proposed R&D programme will identify, test and finesse the suitability and best use of lighting and other technologies to enable and enhance the interactive potential of the fabric and functionalities of each artwork. They will be linked at the same time, to each other and the visitor, by and through the IoE, GPS and mobile technologies. Thus, each element will be able to dialogue, interactively, with its visitors and its surroundings, individually and in concert.

“So Much Depends” ... *on Contexts: Site-specific Art, Cardiff Barrage, Virginia Woolf and Social Inclusion in Wales*

“So Much Depends” is a site-specific and multi-modal art project interested in unsettling and enriching geo-historical senses of space. Geographer Doreen Massey chooses to understand space as “the product of inter-relations . . . always in the process of being made”; as, specifically, “a simultaneity of *stories-so-far*” (9, emphases added). Literary theorists might be tempted to see “So Much Depends” as a kind of materio-experiential narrative playing out in real space and time, according to the navigational and interactive choices made by the visitor/reader wandering the installation. Stories, like any text, depend on mediation. As Stephen Connor recognises, so does anybody and any environment (192). Arnold Berleant defines an environment primarily in experiential terms: as “a complex network of relationships, connections, and continuities of those physical, social and cultural conditions that describe [...] actions, [...] responses, [...] awareness, and that give shape and content to the very life that is mine” (4). In Berleant’s influential understanding of human experience, as a result, “[...] there is no outside world. [T]he perceiver (mind) is an aspect of the perceived (body) and conversely; person and environment are continuous” (4).

Considered in its broadest contexts, any public space seems palimpsestic: layered with psycho-geographic, socio-historical, cultural-political even “lexicographical” complexities both obvious and not (Stilgoe 98). No wonder some theorists construct places, indeed landscapes, much as literary critics construct texts: rich in suggestion; producing as much as they are produced by historical, ideological, socio-economic and emotional values, beliefs and aspirations (Lefebvre, De Certeau). Conventionally, “site-specific” creative practice foregrounds the intersecting resonances which speak and are spoken in and through the specificities of a particular (often urban) environment or “site” (as understood by the writer or artist). For all the debates which are associated with this mode, as Miwon Kwon notes, this genre invariably feeds the immediate into its “cultural mediation of broader social economic and political processes that organise urban life and urban space” (3). Usually originated outdoors, frequently incorporating landscaping or sculptural elements made in consideration of its situation, it might mobilise materialities like the height, length, weight and shape of particular features of the site and/or its contexts; situational specificities like orientation and viewpoint; or conditions like its flora, fauna, pre-existing structures, geology and/or bioclimate.

“So Much Depends” draws the emphases of site-specificity into conversation with “installation” and “interactive” art. Frequently multi-media, often immersive, works categorised as installation art for Claire Brown (among other features) presupposes “an embodied viewer whose senses of touch, smell and sound are as heightened as their vision” (*Installation* 6) and sometimes described as “environments” (Tate). For its part, among other characteristics, interactive art can encompass storytelling and other forms of oral and/or textual communication and expression. Noting “the diversity and interpretative density of artworks that solicit interactivity,” Kathryn Brown constructs interactive art by deferring to Bishop, distinguishing it “primarily “one-to-one relationship” . . . from multi-vocal participatory artforms” (Bishop *Hells* 1-2; cited Brown 5).

Neither of these two similarly baggy genres need be participatory in Bourriaud’s terms. However, like “So Much Depends”—which aligns with key strands of Grant Kester’s work in foregrounding its conjoined sites, and individualising the user-visitor experience—both are capable of “blur[ring] the line between artist and user, advancing the idea of co-creation” (Pai-Ling Chang 5). Thus, our team plans to remember the “implications of participation both at the level of the individual and that of the institutional context in which the art is embedded” (Brown 3). As Bishop warns, “in any art that uses people as a medium, ethics will never retreat entirely” (*Hells* 39). Partly for this reason, while “So Much Depends” foregrounds the transformative agency of the user-visitor, one intention is that the materialities of the different elements speak for themselves, rather than depending exclusively on user-involvement. Definitions aside, our research team wants to ensure, as far as possible, that a “fully inclusive” aesthetic experience takes account of as broad a spectrum of user-experience as design methods, materials-use and technology can make possible.

Dialoguing with various art genres, “So Much Depends” savours the rich matrix of “environments” encompassed by the manmade structure of Cardiff Barrage. Completed in 1999, at a cost of £120m, the 1.1km causeway joins Cardiff’s historic dockland, at the north-east of the freshwater lagoon of the city’s regenerated Bay and Waterfront area, to Penarth Marina in the south-west. The hi-tec site of the Barrage incorporates three locks, 40m long by 16m high, their gates linked to bascule bridges, connecting the Bay to the huge tides of the Bristol Channel; five sluice gates—between 7.5 and 9m in height—controlling water levels in the lagoon; and a specially-designed fish pass. Standing on the tip of the Outer Harbour Arm, the lump of Flat Holm Island five miles distant, some aspects of the site’s engineering are less obvious. It transpired in construction that only one material could withstand the pressure exerted by the tidal waters into which the structure protrudes. The concrete isthmus is itself built on, supported by, water.

The Bay’s industrial history and contemporary heritage converge in its geo-political contexts: the 13km waterfront the causeway protects; the adjacent development of the Porth Teigr area, including BBC Studios at Roath Lock; and the busy maritime world the Barrage borders. Located on this hybrid structure, yoking seaway and lagoon, natural and technologized, “So Much Depends” takes as its farthest geo-cultural locator and focus Flat Holm Island’s 98ft high Lighthouse, visible from the Outer Harbour Arm on most days. Built in 1737, Flat Holm Light not only marks the southernmost point of Wales; it is also one of Cardiff’s least accessible cultural loci.¹

Lighthouses make ambivalent signifiers; they must attract attention in order to repel; their social purpose justifies (*depends upon*) their isolation. Founded on and between the on-off, push-pull, here-there binaries of the lighthouse towards which it looks, “So Much Depends” turns Virginia Woolf, author of the experimental modernist novel *To the Lighthouse* (1927), into a suggestive literary interlocutor. Woolf’s famous text situates the Hebridean holiday home of the middle-class Ramsay family against the social catastrophe of the Great War. The novel ends as what remains of the family, the war over, makes a long-postponed visit to the lighthouse in the bay below the house. Watching their little boat beating towards its goal from her easel in the garden, the novel’s middle-aged protagonist, artist Lily Briscoe provides the anchoring conceptual refrain of our project:

So much depends, she thought, upon distance (177).

For many literary readers, Lily’s struggle to realise her artistic vision in paint, on canvas, parallels Woolf’s own effort to bring her creative ideas (the accommodation of anguish and loss) onto the page. But Woolf/Lily’s words also speak about the lighthouse at the novel’s core, in part by figuring (much like Flat Holm Light on the visual periphery of the Barrage) the actual, temporal and embodied distance separating site, self and other. “So Much Depends” draws these ideas into conversation with the geo-political context of the Harbour Arm site, on the periphery of Wales’ capital city, in sight of the Senedd and other buildings housing the institutions and organs of its polity, law and policy-making.

The overlapping geo-historical, political, actual and imagined ecologies; manmade/ natural on- and off-shore environments; and changeable, salt-laden specificities of the project’s conjoined sites (connected and proximal, remote and distant) have inspired, and will intentionally feed into, the site-specific experience which our team, crossing aesthetic computing with visual and textual arts, envisages for the Barrage. We have seen for ourselves how collaboration and dialogue suggest “new methodologies for and solutions to problems that [neither discipline would necessarily know how] to solve” (Mitchell et al. 191). The IoE is playing an increasingly central (if not unproblematic as the work of Sherry Turkle warns) role in all kinds of social activities, perhaps above all for its ability to cross, or seem to cross, experiential time as well as space. As a “network of physical objects that contain embedded technology to sense or interact with their internal state or external environment,” the IoE links

¹ See “Flat Holm Operations: A Report of the Economy and Culture Scrutiny Committee”. Cardiff, 2012. <https://www.cardiff.gov.uk/ENG/Your-Council/Councillors-and-meetings/Scrutiny/Scrutiny-reports/Documents/EC-%20Flat%20Holm%20operations.pdf>

people, process, data, and things to make networked connections more relevant and valuable than ever before—turning information into actions that create new capabilities, richer experiences, and unprecedented economic opportunity for businesses, individuals, and countries (Cisco).

Supported by owner-managers of the Barrage, Cardiff Council and Harbour Authority, our project team expects and intends to make adventurous use of the IoE in developing “So Much Depends” as a site-specific installation, linking the Barrage Harbour Arm with its environs (including Flat Holm Light, in the “distance”), in an inclusive *affective* aesthetic experience, day and night, year-round.

Cardiff Council (our lead project partner) is interested in increasing visitor footfall on a site it classifies as parkland; transforming the city’s newest park into a more exciting but also more inclusive public space should expand its visitor profile. There are regulatory reasons for this. Disability Wales’ report “Planning for Inclusive Access” (2010) retraces the will to tackle social exclusion in Wales to the early years of devolution. “So Much Depends” addresses and responds to the most recent and wide-ranging example of this history of inclusive policy-making: Welsh Government’s Wellbeing and Future Generations Act [WFGA], ratified in 2015. In the wake of moves by the Heritage Lottery and Museums Association, Cadw and the National Museum of Wales among others,² WFGA holds Wales’ public bodies and agencies to account for “a society in which people’s physical and mental well-being is maximised and in which choices and behaviours that benefit future health are understood”; “that promotes and protects culture, heritage and the Welsh language, and which encourages people to participate in the arts, and sports and recreation” (<http://gov.wales/docs/dsjlg/publications/150623-guide-to-the-fg-act-en.pdf>).

There are ideological, economic and practical reasons to applaud the direction taken by Wales’ policymakers in this respect. After all, as Richards *et al.* wryly note, the processes of ageing alone sooner or later positions most people on a spectrum of disability (1102). Specifically for our project, the Act is explicitly referenced in Cardiff City Council’s “What Matters: The 10 year Strategy” (2015), “Liveable City” reports, and recent “Tourism Strategy and Action” plans (2015).

The research programme associated with “So Much Depends” seeks to evaluate—in order to establish and harness—the potential of HCD methods (outlined below) to develop *inclusive* digitally-enabled interactive public art. Dialogue, used to bridge the gaps between the practices and languages of art and computer science, makes this kind of thinking not just possible, if challenging, but socio-culturally and aesthetically important. Guided by “affect theory” throughout a necessarily dialogic research process, the testable assumption is that HCD will enable us to mediate a resonant public space for a radically more diverse visitor profile, in and through interactive art. From inception, “So Much Depends” has been enriched by reciprocity. The research aims to build a newly “affective” visitor experience of the Barrage in order, transformatively, to “affect” the site-space. In the process of refining the project and its outcomes, the team’s mobilising of affect theory has helped confirm the affective nature and purposes of their research and vice versa.

“So Much Depends” . . . on *Theory*: Aesthetic Engagement, “Affect” and the Social Model of Disability

This cross-disciplinary R&D project draws on a dialogic mix of ideas rooted in aesthetic theory, the materio-technologized *site-environment*, the sensing *body* which experiences or consumes (in literary terms “reads/writes”) it, and the *exclusive nature and effects of aesthetics as social practice*.

Emerging in late nineteenth century America, “pragmatic aesthetics” sought to bring theory closer to the actual, lived, sensate nature of aesthetic experience. Arnold Berleant’s work builds on these foundations. *Art and Engagement* (1991) argues that: art and other cultural experiences are intertwined thus continuous; that the faculties and operations of the sensing or “perceptual” body are integrated; and that perceiver and aesthetic situation (or object) converge in the sensory, conscious, physical and social nature of the

² See “Planning for Inclusive Access in Wales” (Disability Wales); “Valuing Diversity: The Case for Inclusive Museums” (The Museums Association); “Community Archaeology Framework” (Cadw); and Cardiff Tourism and Strategy Plan (Cardiff Council).

experience delivered by “engagement.” In this “all-inclusive, a total, integrated, continuous process” (6), Berleant insists that engagement is definitively *embodied and sense-led*:

[t]he physical senses play an active part, not as passive channels for receiving data from external stimuli but as an integrated sensorium, which equally accepts and shapes sense qualities as part of the matrix of perceptual awareness. This is . . . *direct engagement of the conscious body as part of an environmental complex* (14-15; emphases added).

For John McCarthy and Peter Wright, experiential interactions encompass “a person’s full relationship—sensory, emotional and intellectual” (54). Where aesthetic engagements are concerned, Allen Carlson emphasises the part played by selectivity in a likewise interactive process: “we experience our surroundings as an obtrusive foreground, allowing our knowledge of that environment to select certain foci of aesthetic significance and perhaps exclude others, thereby limiting the experience” (50-51). If embodiment is “engaged action rather than disembodied cognition,” the nature and quality of that “action” will necessarily be conditioned by the sensory, cognitive and physical functionality of the engaging body (Dourish 189).

Many theorists link “engagement” with *affect*. As Isobel Armstrong explains, in its various (cross-generic) guises and differing definitions, “affect” has excited thinkers of all kinds since ancient times. Our research takes its lead from Brian Massumi’s wide-angled assertion that “[t]o affect and to be affected is to be open to the world, to be active in it and to be patient for its return activity.” Massumi’s not uncontroversial glossing of this resonant term stresses its dialogism: “affect is the power to affect and be affected” (ix). For our team, his construction is enablingly both provisional (“we are our situations . . . our moving through them”) and “transindividual”: for him, usefully, “affect, as the openness to being affected, is directly *relational*” (14, 205; emphases added). In its endlessly promissory nature, affect is thus rich in political potential: “always a power to” (18).

In the wake of Massumi and others, our team’s research aims and objectives are based on the assumption that “affect” is always simultaneously noun and verb: *agent/actor* and *action*. As such the processes and results of affect are always rooted in, produced and to some extent determined by the experiencing consciousness. Hence the political value of the “sensorium” which Connor reads into the experiencing (animate) body: “a kind of grammar, economy or system of relations whereby the senses are related to each other” (184-5). The sense-functionality and/or particular needs which an individual brings to that interaction will, by conditioning its nature and intensity, personalise the experience as a whole: “emotional responses to products and interfaces play a dramatic role in people’s perception and evaluation of devices and services” (Zimmerman 1). The material and conceptual machinery described in later sections will underline the alignment of our research process and programme with Massumi’s contention that “[a]lthough affect fundamentally concerns relations in encounter, it is at the same time positively productive of the individualities in relation. In its transversality, affect is strangely polyvalent” (x). Our researchers intend to mobilise the dialogic, polyvalent processes of affect to produce an aesthetic experience, based on engagement, which avoids the exclusory effects associated with the social model of disability.

Now some forty decades old, the “social model” of disability recognises that non-normative bodies and behaviours are socially as well as physically produced and experienced; environmental, socio-historical and cultural forces—including, for some, ideology—can conspire in the reality of living with disability and impairment as powerfully as any more personal or individual bio-medical condition. “So Much Depends” seeks to address, in order to counter, some of “the environmental and social barriers which exclude people with perceived impairments from mainstream society” (Barnes 78).

Research confirms that many of the 2 million people in the UK living with sight problems (only about a third of them registered blind), argue that they are “disabled” less by their own sight-function than by society’s determination of what and how they might or might not be able to “see” (RNIB 2009, 35-36). In Jayne Earnscliffe’s words: “It is not the inability to walk . . . but the steps into a building that disable us” (5). Helen Keller puts it both more lyrically, and more appositely, for a project interested in *affect*: “The keenness of our vision depends not on how much we can see, but on how much we feel” (63).

“So Much Depends” . . . on *Dialogue*: Collaboration, HCD and the Interactive User

Significantly, Anne Sheppard observes that aesthetic appreciation tends to be founded on “detachment, distance or disinterestedness.” As a result, she notes that “in contemplating something aesthetically we are removed from all practical concerns with the object” (69). Based on the contemplation and analysis of representation, the conventional aesthetics which Anne Sheppard describes fails to account for a collaborative aesthetics which might be experiential, interactive and thus both *co-creative* and *dialogic*. Contrastingly, for Linda Candy and Ernest Edmonds, artists should expect “not so much to construct the artwork but rather to specify and modify the constraints and rules used to govern the relationship between the audience and artwork as it takes place in the world” (83).

Elizabeth Sanders and Pieter Stappers define co-design as a collective creativity spanning a design process to which the end-user is essential (2008). Originating in participatory Scandinavian design techniques developed in the 1970s, co-design is a well-established approach involving stakeholders, designers, researchers and end-users in activities and mechanisms organised to produce an informed user-friendly design rationale. Likewise, collaboration or co-production, like co-design and indeed co-authorship, unlocks potential in a dialogic process which opens up any of its participants’ critical and creative assumptions and practices to scrutiny, challenge and cross-pollination. In Ann Vickery’s words, “As a liminal space of encounter . . . [c]ollaboration explores the space [and] interdependency between self and Other” (249).

For our research project, some of the assumptions associated with co-creation and co-design must be unsettled. Conventionally, in the first place, the disposition of HCD methods are collaborative. Based upon “an explicit understanding of users, tasks and environments,” HCD would also seem co-creative in expecting that “users are involved throughout design and development”; that an iterative design process “is driven and refined by user-centred evaluation” and will “address the whole user experience”; and that any HCD team “include multidisciplinary skills and perspectives” (ISO 9241-210: 2010). However, HCD distinguishes itself from co-creation or co-design in assuming that skilled designers, rather than end-users (who typically lack the requisite expertise, experience and insight), would normally be responsible for end solutions.

Co-conceived and co-evolved in collaborative research, like its aesthetic processes and outcomes “So Much Depends” has depended on dialogue from the first. Synthesizing at least three disciplinary knowledges with user-led design practices, advanced lighting technology and end-user insights, everything about this project simultaneously depends on and challenges everything and everyone else involved. By extension, developed in and through in (dialogic) user-experience R&D methods, the interactive aesthetic experience we envisage will depend on the bi-directional flow of information, affects and responses which each and every element will seek to catalyse in any visitor encounter. To affect and be affected thus by visitors, the installation will reflexively *depend on* the nature and degree of curiosity it prompts in anyone who engages with it. How will it do so?

Narrative theories centralise desire: we read in order to find out. For Roland Barthes, narratives encode “affect” as enigma; a story’s “clues” generate the curiosity, or (hermeneutic) desire, which fuel the reader’s continuing engagement (*S/Z*). Rob Tieben et al. have more recently confirmed in curiosity an intrinsic motivator of learning and exploring, a key driver of human behaviour (2011). As Matthew May reminds us, Daniel Berlyne was pre-empting these theorists in 1954, by arguing that “perceptual” curiosity could be “diversive” (seeks out novelty and adventure) or “specific,” which is to say investigative (83). From a more nuanced perspective, Teresa Amabile associates *intrinsic* motivation with interest, involvement, curiosity, satisfaction or positive challenge (115), where T. B. Kashdan et al. find curiosity aroused by external stimuli through novelty, complexity and uncertainty. With the help of the techniques described below, the research team will examine the extent to which curiosity, through “emotion, association and intuition—which are the main ingredients of art—[can be provoked] by digital [instruments]” (Dietrich 3).

McCarthy and Wright identify four main threads in the creation of “experience.” The “sensory” concerns the effect of design and atmosphere on the experienter’s senses; the “emotional,” those emotions induced by the experience; the “compositional,” the integration of its various elements; and the “spatio-temporal,” the influence exerted on the experience by place and time. The different artworks of “So Much Depends” might feed dialogically into any of these broadly defined “threads” at any point, depending on whether and how visitors choose to discern or create links or patterns between different elements (80-89). Specifically, the visitor’s experience of the installation, as envisaged at this point in the project’s development, will begin at the foot of the elegant structure of the Sonic Weather Vane, situated where the Harbour Arm joins the roadway running east-west across the length of the Barrage, along the southern perimeter of the lagoon. Arranged on steel tubes of varying lengths designed to “sound” as the wind plays across them, the Vane’s cardinal points are marked, teasingly, by the initial letters of the first two words of the installation’s title: “so much [depends, she thought, upon distance]”. The note emitted by the structure will alter with the wind direction. The Vane responds in other ways to natural stimuli: the 1.5m by 0.75m mechanism which revolves atop its slender (7m high) mirror-finished stainless steel support, reflects both the light and the kinetic energy of the wind in almost ceaseless movement. The work shimmers as bewitchingly in twilight as in brilliant sun.

The textual riddle of the Vane, contextualised by signage, is intended to launch the visitor into the self-evolving aesthetic journey of the installation as a whole. The yielding ribbon of the Moss Code Pathway is likely to be the largest of the four elements. The details of size, surface area and fabrication will be confirmed in the HCD process. As soft and safe to use as the spongy “tarmac” of a modern playground, the path as currently conceived will embed the third word of Woolf’s text: “*depends*” in the form of gigantic “pro-signs” (the dots and dashes, perhaps appearing to a child as islands and bridges) of Morse Code, in the concrete pavement of the Arm. Encoding Woolf’s words in Welsh and English as often as space allows, this structure will discreetly honour Flat Holm Light’s heritage, as the site from which Guglielmo Marconi transmitted the first wireless radio transmission across water in 1897.

In the model proposed for the first phase of user-testing, the Code Path leads to the next element: an undulating Cloud Seat (subversively impersonating the park or seaside bench) wrapped around the base of the 4m tall green Daymark, its red and green lights signalling the position of the Harbour Arm to mariners. The testing process will explore ways of making this curvaceous sculptural form, probably constructed of opaque resin, and embedding low-level LED lighting technology, safe and inviting to visitors who might want to rest even recline on it. Embossed and etched with different textual and linguistic versions of the word “upon,” including Welsh and English Braille, researchers hope to produce a structure which will prompt visitor-engagement through both the interactive technology it embeds and the intricate forms embellishing its surface. The textual riddle will finally resolve in the oversized Fisherman’s Wind Sock, printed with a photographic image of a traditional knitted sock. Situated at the opposite end of the Barrage from the Vane, like the Path and CloudSeat, the 7m stem of the Sock, etched with the word “distance,” in languages representing as many of Cardiff’s numerous language communities as possible, will converse with the rest of the installation across the physical distance between them.

The team’s intention is that each of these four larger-than-life elements, refined in/by the user-testing process, will mark and play on their congruence with functional objects or practices associated with coastal environments, partly to unsettle expectations of the operational environment in which they are positioned. The aim is to ensure that any visitor to the Barrage will be able to respond in his/her own way to any element they might interact with, depending on variables both predictable (like the weather) and unknowable. The nature and extent of any *affective* individual interaction with elements, separately or in concert, will “author” that visitor’s aesthetic experience, on that occasion, conditioned by the weather and/or any other circumstances.

The R&D process we envisage will be driven by the overarching aim that—individually and collectively—the installation’s constituent elements excite and reward curiosity-led engagement with their plastic, interactive and virtual functionalities. The team will explore the most effective ways of prompting (dialogic) interactive visitor engagement with the installation and its site-environment, less to assert any controlling meaning or “content” for the installation as a whole, than to explore the nature and extent of any affect

any of its elements might generate in any user engaging with them. The provisionality of the aesthetic experience will immerse visitors, individually and collectively, “in co-creation, by interpreting content and constructing meaning and by modifying form and content” simply by engaging with any aspect of the installation (Chang 5).

“So Much Depends” . . . on *Technology and the User*: Interactive Engineering for Curiosity

“When you build a thing, “Alexander points out, “you cannot merely build that thing in isolation.” Rather, he says, the building process should seek “to repair the world around [the “thing’], and within it, so that the larger world at that one place becomes more coherent, and more whole; and the thing which you make takes its place in the web of nature, as you make it” (1).

Man, Freud saw, has habitually resorted to “machinery” in the compulsion towards “perfecting his own organs, whether motor or sensory, or . . . removing the limits to their functioning” (90). John Dewey argues that transformation—dialogically—is as much about influencing as about being influenced (22). An IoE-enabled installation engineered to catalyse, generate and respond to an inclusive range of human affects should also make possible the discovery of new, unexpected and relevant information for its user-visitor. To achieve the visitor/site-experience we propose, through the plastic and technological infrastructure, materials and instruments which the site and IoE together make available, our team must

creat[e] designs that generate a different view on things, helping [its users, via their sensory imagination] to perceive the novel in the familiar [and] discover relationships between seemingly incongruous objects (Wagner et al. 33).

Fiona Carroll has demonstrated how aesthetically-driven cues in a virtual reality environment can trigger certain feelings, personal experiences and emotions (2010). The kind of IoE enabled “engaged *interaction*” we envisage for the artworks of “So Much Depends” will aim to alter user-perceptions of and responses to the environment. The team’s own hope, indeed expectation, is that any transformative affect achieved by “So Much Depends” will derive as much *from* the Harbour Arm and its visitors, as it will induce *in* them, just as the project’s integrated art and smart technological elements will depend on one another, and anyone engaging with them, for their transformative powers. The guiding assumption—among many to be tested by the work we will undertake—is that our project’s social ramifications will stem from its fundamentally dialogic nature.

The theories and processes of affect have been inflecting human-computer interaction [HCI] for some years, as Donald Norman’s work confirms. Today, ever more challenging consumer needs and desires are (*affectively*) prompting digital technology into dynamic real-world contexts populated by everyday objects, through the use of networks (collections of nodes in which certain pairs are joined by links). Damien Lockner and Nathalie Bonnardel argue the value of understanding how to arouse conscious or unconscious emotion through an interface, for example (2). Advances in HCI technology meanwhile reiterate the inexhaustible capacity of the IoE to refurbish the interface between the user and the “thick texture” of a public space which, Berleant reminds us, will enshrine “sensory richness, directness and immediacy, together with cultural patterns and meanings that perception carries” (*Aesthetic* 20). Other researchers have shown how, by building links between nodes, representing different individuals, the IoE can help to redefine human connections, with different implications. For Backstrom and Leskovec (2011), Gupta and Singh (2016), and Zhang et al. (2013), the outcomes are positive; for Turkle, by contrast, the legacy of the IoE is marked by risk and danger (2015).

“So Much Depends” will rely on creating links between this new wave of information-visualisation and usage, and our data-generating network of physical artefacts; the team aims to make “the environment” the user-interface. User-*engagement* with the installation will be facilitated by different electronic sensors, and location-aware and mobile technologies connected to a suitable micro-controller unit such as a Raspberry Pi with Internet/WiFi access. Embedded in the artworks and/or carried by a visitor, such technologies can

make a range of sensory interactions possible. With the help of user-tags, radio-frequency identification (RFID) sensors will be capable of identifying and tracking visitors’ progress through their proximity to any element of the installation. User-information will be registered via the RFID tag to sensors embedded elsewhere on site, specifically in different artworks: working in concert, beacons and sensors will seek to tempt visitors into and through the installation’s different intersecting elements and environments, seeking to enhance different aspects of the visitor-experience, affective encounter by affective encounter.

Internet-enabled micro-controller processes will at the same time distribute this information to a website-linked smartphone application with which visitors can build their personalised narrative-like journey through the site and its various aesthetic stimuli. For example, time-specific data about weather, windspeed and direction, and other meteorological conditions, captured by the Vane or obtained from a real-time web service (as used in the eCloud project)³ will be transposed into sonic ambience by the app to enable the Vane to signal which way the wind is blowing *aurally* for visitors (sight-impaired or not). The same technologies will enable the Wind Sock to convert meteorological data into sonic possibility. The Seat will use information it receives continuously from the site-embedded light and temperature sensors in two ways; to collect and transmit the data to the micro-controller for processing, and to offer an autonomous physical response to the data. Thus, with the help of sensors and LED lighting technology the seat might respond to variations in the site’s temperature, or (through visitor interaction) through its own temperature and/or colour, or (via pressure-sensors) some other touch-enabled behaviour. On a cold day, the cloud might warm up, and/or turn orange, and/or respond to the pressure of a fingertip exploring its raised or incised textual inscriptions. On a warmer day, the installation might feel cooler to the touch and/or seem tinged with blue. User location and movement will be measured using a combination of conventional GPS and, more recent, beacon technologies (see Townsend et al. 2014, and Ashby et al. 2017 for beacon overview and example application).

The mobile application will be aligned to a user-led interactive website hosting and archiving pertinent historical, narrative and other materials about the Barrage, Flat Holm and their shared locale. In this way, the application is intended to help inscribe the resonances of the Barrage’s geo-historical contexts on our technologically sensitised installation. To deepen the visitor’s immersion in those contexts, the application will invite them to reflect on their experience of the artworks and/or add their own creative responses to the strata of narratives and other sources.

The primary and overarching objective is that any affective experience generated by the installation is designed—through the range of spatial, material, digital and virtual functionalities outlined above—to be capable of engaging and responding to as wide a variety of visitors as possible. The intention is to bring this objective nearer with the help of intensive and iterative (laboratory and site-based) user-experience testing. The HCD approaches we expect to employ will include site-based observation of behaviours; semi-structured face-face interviews to explore user motivations, beliefs and values; and concept testing (with the help of storyboards for example). These methods will be used in conjunction with iterative testing of users’ experiences of design prototypes in a simulated site-environment of the Barrage, in order to evaluate the effectiveness of design decisions in meeting the needs of an appropriate broad spectrum of end-users, to realize the project’s overall objectives.

A secondary intention is to make visitors more aware of their own presence as well that of others in the environment; to transform them into receptive, interactive *co-creative* agents in the (site-specific) aesthetic experience which our artefacts on site will seek to catalyse. Keeping in mind the potential of the IoE and smart technology to exclude, as well as include (whether for economic or sociological reasons), a final goal is to ensure that both other objectives can be achieved, at some significant level, *without* any need for expensive handheld (or other) technology in line. In line with Dourish’s work on embodied interaction, the team, therefore, aims to equip each element of the installation with sensors triggered by some kind of haptic or bodily prompt, possibly simply physical proximity (189).

³ Koblin, Hafermaas and Goods, 2010. <http://www.ecloudproject.com/index.html>

“So Much Depends” . . . on *Collaboration*: Affect across Disciplines

“So Much Depends” centralizes the collaborative potential of art and design. As Alex Trochut declares in his art/design manifesto:

Design is solving a problem. Art is raising a question. Design is conclusive. Art is an open debate.
 Design is being an actor and following a script. Art is writing and interpreting your own story....
 Design needs a collective acceptance. Art only needs an inner approval.
 Design is an act of empathy. Art is an act of freedom.
 (<http://www.creativebloq.com/graphic-design/difference-between-art-and-design-51620336>)

The affective dialogues between material and digital technology described above confirm, as well as replay, the dialogic logic and methods on which this project “depends”. In the testing phase of the research, a range of HCD activities will permit focus-groups to reflect, discuss and refine ideas for the desired interactions and experiences on the Barrage. The HCD techniques will enable the research team to deepen their understanding of the kinds of affective interactions which give David Bordwell and Kristen Thompson pause:

Without the artworks prompting, we could not start or maintain the process; without our playing along and picking up the cues, the artwork remains only an artefact. . . . These cues are not simply random; they are organised into systems. The idea of a system is straightforward: it is any set of elements that *depend on and affect* one another (34; emphases added).

In this way, our project returns us to the ceaselessly suggestive, ceaselessly mutual process which Massumi ascribes to affect. In theory and in practice, “So Much Depends” confirms the significance of affect to its (co-)conception, development, functional processes and (imagined) outcomes. Affect explains, will enable and can be used to justify the two-way connections “So Much Depends” will be seeking to make (to cross the “distance”) between testers and different user groups; between different testing environments; and between different phases of the testing process, as we adjust, refine and finesse the R&D in response to results. The project exposes, moreover, the extent to which affect and its processes can be recognised as underpinning the evolving relationship between researchers and site; between site-environment and the artefacts with which we propose to furnish it; between the cognitive/imaginative and sense-led responses of any kind of visitor and any of the artwork elements; and finally, between one user and any other(s).

Our ambitious project objectives would never have been conceived, still less have any chance of being brought to fruition, without the diverse expertises of the team. However, it seems finally worth observing that, as any cross-disciplinary researcher will know, productive collaboration depends on finding productive ways to work across the boundaries and barriers which mark different disciplinary specialisms and behaviours: from the frequently different ways in which different researchers understand common or similar terms, say, through the assumptions and language(s) of a particular discourse, to the conventions, habits, methods and even terminologies of unfamiliar working practices. Immersed in these problematics, we contend that the incurably, powerfully, affective nature of *collaboration* (in any form) is worth recognising and taking account of in the research process itself.

In the teaching-led institutional contexts in which it is being forged, “So Much Depends” has itself depended on the many different forms of dialogue, virtual (email, Skype, and other online platforms like, WhatsApp) and more conventional (meetings, documents, notebooks and conversations) in which the team navigated and reconciled the gaps, tensions and overlaps between their different specialist practices, principles and languages. Questions, confusions, debates and occasionally disagreements arising in (sometimes stemming directly from) the domain in which the team has a common shared interest and investment, have predictably sometimes impeded the research process: as well as resolving particular discipline-specific problems, their shared objectives and common research goals the team has learned to expect to meet and have to resolve cross-disciplinary differences in pursuit of whole-team solutions.

In the email extracts below, the researchers struggle to clarify the research objectives which will ensure and justify a shared goal: enabling an affective, mutually productive encounter between visitor and site. The overall objective is less in question than the means of (and reasons for) achieving it. And, by extension, the ways in which the various possible solutions are articulated, so that different team members are alerted to the kinds of theoretical, as well as practical, issues which, from their different perspectives, specialists in one discipline may bring to a query raised by a researcher trained in another:

HCD expert [HCD]: “I think the main narrative in my head at the moment... is that we are looking to the aesthetic (aesthetic of combined art, text and technology) as a potential way of emotionally connecting with people... and in turn as a way of “including” them?”

Visual artist [VA]: “Are we intensifying a sense of phenomenological awareness through artefacts and access to the intangible through data and other media materials? To evoke emotion? We could simply look at the sea towards Flat Holm, and our emotions will be stirred. What will we be able to offer through the interactive artworks that will come close to that? I could listen on my phone to my favourite Maria Callas track and look out to sea, and my mood will be intensified. The art we make will have to be powerfully arresting to enhance the experience of place.”

Textual theorist [TT]: “These make me worried that I have been working on an assumption which no one else has. When we talk about authors and readers in my sphere, we don’t try to or want to determine responses from people we can’t know and will never meet. We speculate about the many different responses an author or text might prompt in (any number of different) readers. So we tend to ask questions rather than try to guess at specific answers (responses) we can’t hope to prove.”

The exchanges confirm that conceptualising a solution to the same problem for community of users depends as much on language-use as their co-ownership of different practice-based implications. As the different interlocutors represent their own interests and concerns, and the different areas of knowledge begin to integrate (in and through the refining of the implications resting in the relationship between word and idea), the evolving dialogue brings the end-user gradually nearer to the process of co-creation which each of the researchers envisages. At the same time, the affective reciprocities of the conversation *itself* are productive: the give-and-take of the dialogue itself knits its participants, transformatively, into the affective, co-creative process they are working together to conceive, utter and justify. After much further discussion, the correspondents finally arrive at an objective they have co-constructed. Collective understanding makes way for collective—cross-disciplinary—endorsement:

TT: “I think our job is to make it possible for different visitors to encounter and engage with the art in whatever ways suit them. Every visitor, any kind of visitor (the perceiving / sensing / imagining / embodied subject) will respond differently. Our research is for me a way of making that possible for as many sensing selves as possible, rather than trying to determine how it will actually work in each person.”

VA: “These questions have led me to ponder the idea that we create events in the space, in the artworks, for users to find. Those events might involve participant users who come back to the space, in fact, returning repeatedly to the space might be the key to content generation. What I am prodding at here is I am not convinced that a good (audio) book a nice place to sit, the sun and some sublime tunes are not enough to enhance my sense of wellbeing.”

Conclusion: “So Much Depends” ... *on Affect*

This article explores some of the early challenges faced by a team intent on designing an inclusive aesthetic experience in and on a complex site, for a complex audience profile. From our multi-disciplinary perspective, the development of the project outlined above has been as energizing as it has been challenging, framed by new, hybridic and/or unfamiliar modes of co-thinking and co-working. Both tool and focus of our study, technology has been an important enabler, helping researchers cross several kinds of distance in their pursuit of several common goals. The implications of the exponential-seeming development of technology for the colourful tapestry of human society and culture can seem dark. Might the IoE not threaten the kinds of individual needs and differences we want to respect and protect, in mobilising it?

Our research project addresses the implications of inclusivity for people living among the increasingly technologized structures, processes, commodities and habits of today's world. Can a technologically-enabled site-specific art installation be produced to make anyone—whatever their age, cultural background, physical, sensory or cognitive capacities—feel more socially and emotionally included? Our cross-disciplinary challenge is to craft from a spectrum of affective possibilities a contemporary aesthetics capable of engaging any kind of visitor. Can the HCD process we propose successfully design and fabricate digitally-enabled artworks capable of provoking affective encounters with a complex site with any kind of visitor? The conviction that it might, and might thus enable a young wheelchair-user or elderly autistic to experience some (any) of the aesthetic and imaginative riches encompassed by the Barrage, in a mode or form which suits, seems reason enough to keep going.

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