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The Business Case for Media Architecture: Modelling Project Benefits to Justify Investment

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A growing portfolio of global media architecture projects and sustained research interest in the domain suggest that the discipline is here to stay. With practical knowledge becoming easily accessible to clients, architects and urban planners, we notice a shift from traditional advertising screens to integrated context-aware installations. The challenge now becomes to understand investment return of media architecture in order to ensure ongoing support by clients and funders. In this paper we study *The Digital Bricks*, a 208 megapixel media façade integrated within a university building. We describe the project vision, engagement strategy and design outcome, and analyse in detail the business case for the project. We share considerations to support development of business cases for media architecture projects that favour engagement, cultural and innovation capacity over financial returns. As the discipline matures, our insights will help in the endeavour to convince clients to invest in media architecture that inspires and engages audiences.

CCS Concepts: • **Human-centered computing** → HCI theory, concepts and models; • **Applied computing** → *Architecture (buildings); Marketing*;

Additional Key Words and Phrases: Media architecture, media façade, business case, engagement, project management

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1 INTRODUCTION

City skylines increasingly sparkle and glitter in an attempt to create unique, memorable and welcoming urban experiences. As interactive lighting is integrated within our built environment, innovative forms of media architecture encourage new interactions between people and places [9, 43]. Media architecture gains widespread recognition for the positive impact on city-dwellers' appreciation of public space and urban life [18, 68, 74], with cases including cultural venues, corporate buildings, temporary constructions, plazas and transport hubs, and gradually also branching into the residential building sector [1, 22, 30]. The current portfolio provides unique angles for research on a broad range of themes, including human-computer interaction [10, 16, 71], architectural and urban design [6, 29], street and urban lighting [31, 49] and digital place-making [17, 44].

The list of media architecture cases grows as mega project developments and building booms surge in nations that experience significant economic growth [40, 42]. Attractive investment climates create a vibrant environment for lucrative property development deals with access to

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highly skilled design and engineering professionals. As a result, over the past two decades signature-designed 'image projects' have come to life [51], many of which contain forms of media architecture to align with bespoke place and brand marketing strategies. This development is noteworthy as it coincides with the continuing replacement of advertising screens and billboards by architecturally integrated display technology [65, 72]. As the medium changes from traditional high definition, standard aspect ratios to irregular shapes and resolutions with culturally curated content, and as forms of interaction between people and places become more inventive and unique, the financial and non-financial return-on-investment of media architecture becomes more complex to define. Rather than serving advertising purposes, media architecture projects increasingly favour fulfilling cultural or societal purposes, including, for instance, social engagement with peers in public space [15, 16], civic engagement with societal issues [8, 60], and creative engagement with content and technology [35, 74]. This trend begs the question: how do clients, architects, designers or builders legitimise the significant expenditure? What benefits, if any, does media architecture yield for these stakeholders? And how can these benefits be communicated to convince clients or investors to pursue innovative media architecture? These questions are particularly relevant in the light of rapidly changing and volatile global economic conditions and the subsequent re-prioritisation of budgets and expenditures.

In this paper we provide further understanding to the business case for media architecture. We study *The Digital Bricks*, a media architecture case whose design and realisation the authors were involved in¹. From the outset, this particular case did not envision to provide direct financial returns to its client. The business case for *The Digital Bricks* instead articulated non-financial outcomes—principally a multitude of engagement benefits—that the project realises for the client. We share a range of considerations for authors of media architecture business cases, relating to its (a) strategic opportunities, (b) engagement benefits and (c) overall engagement benchmarks of future projects. Our considerations serve as a reference for media architecture designers, architects and clients to uncover the way forward in legitimising capital spend on media architecture projects, particularly when goals other than financial ones are sought to be served. Engagement benchmarking is of vital importance to ensure uptake and growth of the media architecture discipline. In support of future endeavours, we propose a conceptual *Model of Engagement* to assist in the process of uncovering the various engagement benefits afforded by media architecture projects.

2 PROJECT JUSTIFICATION: COMMERCIAL AND PARTICIPATORY APPROACHES

Public space advertising, also known as out-of-home advertising (OOH), is a well-established major force in global economies. Transitioning from print media to digital infrastructure in the late 20th century, the industry grows ever more capable of shaping the behaviour of inhabitants, workers, shoppers and tourists as they explore urban public space [64]. The financial model that underpins digital out-of-home advertising (DOOH) is proven and relatively unambiguous, largely defined by the number of onlookers that can be reached by advertising content campaigns and their subsequent impact on shopping behaviours [32]. The same metric may seem applicable to media architecture through its technological similarities with DOOH. However, media architecture tends to display more artistic content rather than advertising content. Other metrics are therefore needed to substantiate economic viability and to contribute to the development of business cases. The nascence of the discipline prompts us in this section to first examine the practice of business case-based project justification and advocacy. We then discuss how project benefits can be revealed through design practice.

¹<https://awards.mediaarchitecture.org/mab/project/222>

2.1 From Project Idea to Business Case

Crafting and appraisal of business cases are common practices in accounting, project management, and engineering and technology management. The process results in a formal justification for investment in a solution that addresses a specific problem or opportunity. A business case enables the evaluation of benefit, cost and risk and provides a rationale for the preferred solution, typically in comparison to alternative options [47]. While the term ‘business case’ may conjure notions of financial benefits like revenue or profits, formalised business cases have been widely adopted in non-commercial environments for undertakings that have no direct financial return but yield environmental, cultural, health, or other social benefits.

In order to assist with effective decision-making, a business case needs to specify, often quantitatively, the expected benefits and indicate the mechanisms through which the proposed solution will create and yield benefits to relevant stakeholders. Projects that involve mature interventions and practices can readily support expected benefits and benefit realisation mechanisms with robust empirical evidence or available benchmarks. However, business cases for unique and innovative projects may rely more on theory-informed hypotheses and creative analogies.

Business cases often seek to explain direct and indirect benefits. For example, in a commercial context project advocates would typically present evidence and arguments to demonstrate that the proposed solution will directly contribute to maintaining commercial viability or promote profitable growth. Pertinent contemporary examples that rely particularly on a well-founded rationale for indirect financial benefits include business cases for boosting diversity in recruitment, environmental sustainability, or employee well-being: they require a logical argument for how an initiative aimed at these socially and normatively desirable issues provides a commercial benefit via intermediary outcomes that ultimately lead to lower costs or increased revenues. This logic is often presented as a multi-step causal model—commonly referred to as a ‘Theory Of Change’ (TOC)—that articulates from inputs, through activities and to outcomes how the proposed initiative creates and captures benefits [19] (see Figure 1). A clearly articulated TOC aids funding decisions as it allows decision-makers to assess the plausibility of projected costs and benefits, and to gain a granular understanding of project risks and a proposed solution’s flexibility with which it can respond to unanticipated contingencies. Once funding is provided, the TOC can serve as the backbone for project monitoring to ensure that project benefits actually materialise [62].

The TOC presented in a business case can extend to fairly distal outcomes, i.e. to outcomes that project proponents cannot directly influence or control. Increasingly, business cases are expected to provide not only evidence-based projections of financial and non-financial outcomes, but to also show how project benefits relate to or *impact* clients’ long-term strategic objectives [55]. This requires advocates to demonstrate that their project is aligned with a client’s strategic assumptions, including what critical challenges need to be addressed by the organisation to succeed and what methods are suitable to do so [56]. To demonstrate strategic alignment a TOC extends its causal model beyond immediate deliverables—such as the on time, on budget, and on spec installation of a technology—to issues related to stakeholders’ engagement with the solution over time and the consequences of that engagement. This explicit link to a client’s strategy is both critical and helpful for projects that do not yield direct financial outcomes: because an organisation’s strategy

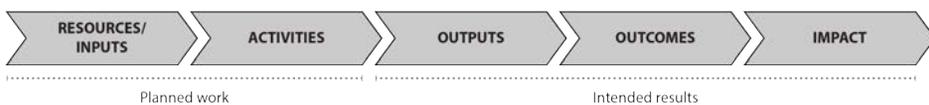


Fig. 1. A simple linear pipeline logic model. Illustration based on W. K. Kellogg Foundation [73].

represents a theory of value creation and capture, presenting a convincing case for strategic fit can obviate the need for complicated, idiosyncratic (and potentially misaligned) arguments for indirect financial impact of a project.

Business cases can be challenging to appraise, even when they present elaborate justifications and detailed TOCs. This is due to potentially biased or unreliable information presented in the business case by its authors. As Kopmann et al. note: “*The obligation to present a business case may come along with negative side effects such as self-deception, creative calculations of assumed profits, over-reliance on unrealistic assumptions, strategic misrepresentation and, in some extreme cases, even fraud*” [34]. Systematic participation of stakeholders in the business case development process is among the commonly accepted solutions to mitigate this problem. Participation allows stakeholders to leverage their unique knowledge, experience and perspectives, and to collectively identify and challenge problematic underlying assumptions made during the development of the business case [45, p. 174].

2.2 Revealing Benefits through Participatory Design

As a discipline that spans across architectural design, human-computer interaction, engineering and communication science, media architecture thrives on various forms of engagement throughout a project lifespan. In the scholarly literature, engagement activities are often viewed through the lens of Participatory Design (PD). Similar to business case development, PD also is concerned with the benefits of a design solution and offers mechanisms through which a design solution is created [e.g. 3, 30, 35, 36]. As Dalsgaard and Halskov argue, PD processes that involve stakeholders enable the exploration, negotiation and determination of interests and expectations ahead of project construction and delivery [9, 13]. This is similar to architectural design, where clients and design teams forge essential, constructive partnerships from the outset, and where a consultative process is required to ensure initial knowledge exchange and ongoing feedback and follow-up throughout the design and construction process [70].

PD as design practice and research area is based on the axiom that people who are affected by a design solution have the right to influence a design solution through participation in the design process [21, 63]. PD addresses ways for users and professional designers to collaborate in the design process, based on core values, such as democracy and quality of working life [25]. In addition to the core values, The Handbook of Participatory Design [63] highlights fundamental mechanisms of participatory design such as mutual learning, collective reflection, and giving users a voice by providing them hands on experience with prototypes. Outcomes of the PD process influence the design and functionality of a project, and support the articulation of opportunities and objectives that form part of the project’s business case.

Participatory design offers a range of methods of tools for enabling participation or engagement during the design process [58] and have more recently been concerned with the unfolding of participation over time: during, between and beyond participatory design events [57]. To this end, Program Theory [54] suggests a TOC for PD interventions that supports the *evaluation* of benefits of engagement in the design process according to timescale, and in line with Figure 1, addresses: (1) the output, in terms of the tangible or intangible products, for instance a prototype, (2) the outcome, i.e. the short and midterm effect, for instance a new professional skills, and (3) its impact, the long term effects, for instance new relational norms based on democratic influence [27].

Whereas PD was originally concerned only with user participation in the design process, PD in contemporary design research plays a dual role; i.e. participation in the design process and participation in relation to the use of the design artefact. An illustrative example of the latter is the Participation Gestalt framework, which offers an approach to understanding the participatory

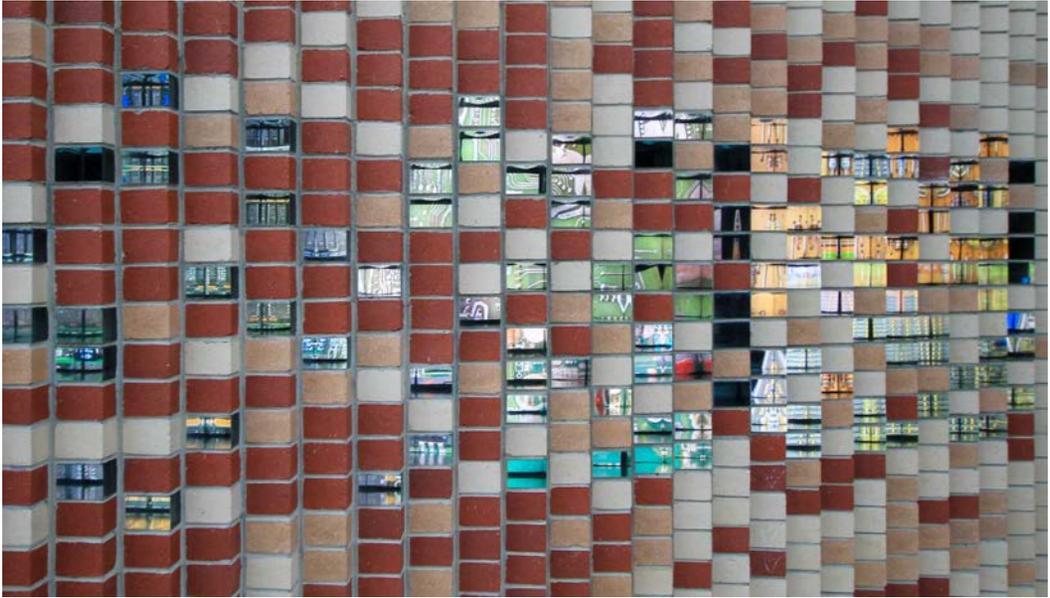


Fig. 2. Close-up of *The Digital Bricks*, containing polished translucent bricks interlaced with traditional clay bricks. All bricks are stacked at varying, predefined depths relative to adjacent bricks. Each ‘digital brick’ consists of a translucent brick with a rear-mounted high definition and high brightness LED screen that are invisibly located within the wall cavity.

qualities of interaction [11]. The framework facilitates analysis of participatory qualities of engagement or interaction with media architecture and consists of five qualities of participation in relation to the degree of exposure, investment, expression, sociality and persistence that unfolds in interaction. These qualities can provide a useful starting point to plan for and assess how and to what degree stakeholders engage with media architecture, and to theorise how their engagement derives benefits.

In the following we describe the PD design and business case development process of *The Digital Bricks* and offer specific considerations to uncover engagement benefits and to inscribe them in business cases.

3 CASE STUDY: THE DIGITAL BRICKS

The University of Melbourne is creating a new innovation precinct, Melbourne Connect, in line with its strategic ambition to create environments that promote creativity and collaboration through multidisciplinary practice². Academics will be co-located with industry partners, government entities and creative practitioners in order to enable a radical rethink of innovation processes. The client, i.e. the university, recognised the value that media architecture could add to the precinct, in particular by complementing the built form of the precinct with innovative display technology. In this section we summarise the concept design of *The Digital Bricks*, the subsequent business case components, and the construction that commenced following business case approval and funding commitment.

²<https://melbconnect.com.au>

3.1 Research Methods

We approached *The Digital Bricks* as an ‘exemplary’ or ‘representative’ case [61] of a public sector-funded media architecture project that has been developed through a participatory multi-stakeholder design process. Since the author team includes the project coordinator, our research method also has a participatory aspect, i.e. a study design that involves participants “*in all phases of the research process, from conceptualising the study to writing up and disseminating the findings*” [50], and that aims to centre their experiences and voices, and to support their change goals.

We based our case analysis on (a) official documentation created for the project, including funding proposals, strategy documents, technical reports, design sketches and visualisations, and emails; and (b) personal notes by the project coordinator taken during the development process. Following a review of these documents, the author team conducted a series of reflective conversations, and subsequently developed a concept mapping [37] that served as the foundation of the model presented in the paper (see Figure 6).

3.2 Concept Design

A series of PD workshops shaped the rationale for a media architecture solution, seeking a design that integrated seamlessly within the building’s architectural form. The nature and outcomes of these workshops are explained in detail in Wouters et al. [75]. Client, architects, engineers and builders collectively considered the ground floor brick podium the most suitable zone for media architecture. This decision was guided by the appeal of the brick podium and the heritage references of the building material within the City of Melbourne. Despite the extensive DOOH advertising network operated by the university on its campus, control systems were not expected to be compatible. This decision enabled a unique, curated content program to be developed alongside the project design and prototyping.

The resulting concept for *The Digital Bricks* encompassed the interlaced placement of 226 polished translucent Venetian arctic crystal bricks (i.e. glass bricks) within the podium’s conventional clay brick cladding (see Figure 2). Glass bricks are installed around eye level (1 to 2 meter above ground level) at either side of a major precinct entrance. Each glass brick sits in front of a small, high-brightness and high-resolution LED screen, effectively creating a transparent mosaic of so-called ‘digital bricks’.

In order to ascertain feasibility and buildability of the envisioned design, a 1-to-1 scale prototype was constructed and reviewed by client and builder teams. This step was enabled through a seed fund provided by the university. Developed as a gateway point to evaluate technical assumptions and to determine suitable technologies, the prototype also helped to ensure appropriate construction methods were selected to support digital equipment and to ensure differential movement between the two brick materials was resolved. The prototype proved successful in working through construction risk and aligning all audiovisual and construction industry partners to ensure appropriate methods were in place to achieve the desired outcome. Ultimately, the prototype was the starting point for the development of the business case and to seek investment from the university.

3.3 Business Case for *The Digital Bricks*

With the fundamental aspects of the media architecture solution designed, built and evaluated, core members of the client’s project team developed a business case in order to convey to university executives the vision, relevance and cost-benefits assessment of the project. In this section, we unpack the sections of the business case. Approval of the business case by university executives enabled design development and following funding release also subsequent construction.

3.3.1 *Opportunity.* PD workshops preceding the Concept Design helped identify a series of opportunities that reflected the university's strategy as well as the intentions of the innovation precinct itself. As a result, *The Digital Bricks* were presented in the business case as an “*opportunity [...] to signify [the innovation precinct] as the home of data-driven innovation via the incorporation of a responsive media-rich digital façade within the fabric of the building. As a world-first, the project will deliver tangible local outcomes and achieve global attention*”. Specifically, opportunities were identified to focus on four main themes:

- *Provide a media platform to showcase innovation.* The media façade was identified as an embodiment of architectural and technological innovation through its design and functional characteristics. For instance, through its dynamic nature, an opportunity was identified for research data to be shared with the general public by way of compelling data visualisations onto the façade.
- *Enable new ways to engage with diverse communities.* The business case outlined that stakeholders would be provided with tools and techniques to contribute to content design. Quality would be ensured through a range of open participatory processes and well-defined curatorial practices, thereby heavily relying on the engagement from the on-site gallery.
- *Embed new research and teaching infrastructure within the precinct.* While serving as a mechanism to display research output, the media façade was also expected to support research and teaching initiatives in its own right. Aspects that were identified to be relevant included its technical infrastructure (with links to the university's engineering faculty), content programming and curation (with links to students in creative arts and arts management), and engagement opportunities (with links to the on-site gallery and relevant programs such as hackathons and festivals).
- *Promote a sense of place.* The media façade was expected to benefit tenants and the public by providing a unique day and night time experience of a shared urban space. In subtle and architecturally responsible ways, the façade will contribute to the aim to landmark the precinct building, thereby increasing brand awareness of the university, the precinct and its tenants, the gallery and—in a broader context—the city of Melbourne.

Besides underpinning the opportunity that the media façade would present, the business case also pointed out that not proceeding would prevent the building from “*demonstrating digitally enabled and data driven solutions [and therefore] running the risk of not exemplifying innovation*”.

3.3.2 *Strategic Objectives.* The innovation precinct's strategy specifically aimed to enable the development of innovative solutions to major societal challenges. Hence, the business case argued for the media façade's strategic alignment by providing a canvas to “*reflect knowledge creation and innovation [by utilising] student and research engagement as a source of cultural communication and improved public space experience*”. Engagement was an essential project justification, providing a platform that adds visibility to innovation precinct tenants, the university and their respective activities, such as by:

- Increasing the physical presence of the university within its urban and global context;
- Exemplifying the notion of innovation precincts as “living labs” by embedding innovation within the built form; and
- Engaging university and local communities in creative processes related to *The Digital Bricks* and associated programs.

3.3.3 *Strategic Justification.* Alignment was sought between the project's objectives and the long-term engagement and communications strategy as set out by the university and relevant tenants within the innovation precinct. The alignment informed the justification of *The Digital Bricks* to

centre around contributing to the university's ongoing programs that aim to enrich the experience of students and community members on campus, as well as to enhance the university's brand identity among prospective students and industry contacts.

The business case argued for the justification of the project through a range of outcomes it would enable: presenting precinct activities through a different lens, focusing on enabling new forms of community participation, and encouraging the public to learn about the university and scientific innovation, to explore stories of place and First Peoples, and to gain exposure to cultural programs delivered by precinct tenants. The precinct's cultural anchor tenant would be empowered to curate content for the project through participatory methods such as hackathons, artistic commissions and other forms of interactivity and crowd-sourcing. These opportunities would specifically seek to involve those stakeholders affiliated with the precinct and the university (e.g. academics, staff, students) as well as beyond (e.g. nearby residents, tourists, artists).

Overall, the business case justified the investment by way of "*the unique and novel engagement opportunities that the project introduces [and] the mechanisms it enables to involve new and existing audiences in the exploration of science, engineering, innovation and the arts*".

3.3.4 Benefits. From the outset, *The Digital Bricks* project team did not envision to generate a direct financial return. While there would have been opportunities to forecast the number of onlookers that can be addressed, the project team and the university did not pursue DOOH advertising revenue streams. The business case unambiguously reported on the project's inability to generate significant revenue enhancement, notwithstanding future research and engagement projects may attract revenue from research funding initiatives and philanthropy. As a result and given the predominantly qualitative intentions of the project, three distinct types of engagement benefits were identified.

- Reputational benefits, such as by growing the university's brand awareness and reputation among local and global audiences.
 - Expected contribution. *The Digital Bricks* were presented as an opportunity for the university and the innovation precinct to "*strengthen a pioneering role in terms of architectural design, urban technology, and human-computer interaction*".
 - Success metric. Success will be evaluated through the analysis of mainstream and social media activity in response to the façade and its individual content programs.
- Experience benefits, such as by enriching the atmosphere and ambience of campus life as well as the surrounding urban environment.
 - Expected contribution. The business case highlighted the processes that will be established to enable participation from community members in content design processes. In turn, the participatory nature of the façade was flagged as "*a new benchmark in science communication on an architectural scale*". The latter predominantly benefits the aspirations of the on-site art-and-science gallery space that will publish thematic content onto the media façade.
 - Success metric. Volume, impact and continuity of participatory programs will contribute to the evaluation of success.
- Academic benefits, such as by providing contributions to research, education and curatorial programs by the university and its partners. Specific outcomes envisioned include (a) in-situ studies of interactive prototype technologies and effects on the community; (b) co-development and evaluation of novel interfaces [26]; (c) content design and curation initiatives; and (d) public communication of research datasets in engaging ways.
 - Expected contribution. The media façade was coined as an opportunity to showcase research capabilities and to enable new research initiatives by local and global collaborators in fields that align with the precinct's core focus areas. Similar examples of university-operated

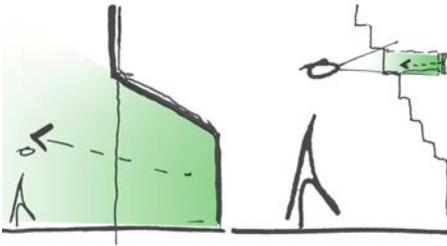


Fig. 3. Viewing experience of *The Digital Bricks*, from distant perception as light feature (left) to intimate viewing of individual screens (right). Image © Arup

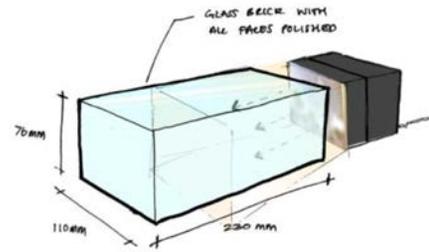


Fig. 4. Concept sketch of a 'digital brick', consisting of a polished glass brick and rear-mounted high-definition electronic screen. Image © Arup

media architecture across the globe have delivered significant contributions to ongoing local research agendas [28, 48, 52].

- Success metric. Success will be evaluated by way of publication metrics, analyses of emerging research collaborations, and curatorial analyses of participatory content programs.

3.3.5 Cost. Prototype construction and review enabled refinement of detailed cost estimates. This process allowed for transparent communication, full understanding of budgetary implications imposed by the project, and efficient decision-making in terms of refining design direction and adjusting project scope. Cost estimates covered aspects such as research and development, prototyping, detailed design, procurement of building materials, light fixtures and technical components, construction works, experience design and installation of all systems. Detailed estimates formed part of the submitted business case.

The business case reported on anticipated dis-benefits created by the project in the form of operational expenditure. While accurate operational costs remained unknown until after the first year of operation, assumptions were made against criteria such as energy consumption, maintenance and replacement of façade electronic components, contractor call-outs, and cleaning costs.

Staffing requirements to ensure that the project is delivered and maintained, were already ensured through existing operating and business plans that govern the innovation precinct. Hence, no additional staff costs were anticipated and required through the business case, instead assigning available curatorial, operational and engagement staff as key enablers of project outcomes.

3.4 Construction and Implementation

Prototype review enabled the resulting design to cater for varying levels of its onlookers' proximity. An intimate connection is created as text becomes readable and graphics become crisp and clear when bricks are viewed from less than a meter away. From afar, individual bricks are perceived as single coloured pixels, collectively transforming into a lighting design feature that attracts passers-by towards the precinct entrance (see Figure 3).

3.4.1 Technical Specification and Construction. Individual LED screens have a resolution of 1,280 by 720 pixels at 1,500nits brightness, effectively delivering a digital canvas totalling upwards of 208 megapixels, placing the media façade among the world's largest video screens. Once spatialised to accommodate façade scale and brick layout, content is rendered at an approximate 845 megapixel resolution. Figure 5 illustrates that spatialisation results in black output being generated for locations where clay bricks are present. Screens are powered and controlled individually via a combined PoE supply and Network Device Interface (NDI) stream, resulting in 226 Cat6 cables that connect screens to network and server hardware housed in an on-site audiovisual equipment cabinet. Individual

screens draw 25W power at maximum brightness. Capacitive sensors attached to each glass brick are able to detect surface touch.

The manual production process of glass bricks introduces non-uniform optic distortions such as refraction, blur and reflection as they are being looked through (see Figure 4). These effects are embraced for their aesthetic quality and pseudo-holographic effect they create as onlookers observe content. Gimbals with three degrees of freedom ensure individual LED screens sit flush against the rear of a glass brick. Construction of *The Digital Bricks* commenced in late 2019. Construction continued into 2021 with commissioning scheduled for March 2021.

3.4.2 Content Design and Management. The debut content program consists of *The Digital Birthing Tree*, a dynamic looped visualisation that is designed to pay respects to Traditional Owners. The piece is curated by a First Nations designer and brings to life photographs of several thousand artefacts from the university's cultural collections reflecting First Peoples heritage and culture, as well as scientific innovation in the fields of engineering, medicine and biological sciences [2]. Photographs are manipulated in a variety of ways, including by way of neural style transfer in order to create visual connections between image collections and to instil a sense of intrigue and ambiguity among onlookers (see Figure 5). Reflective of traditional smoking ceremonies, animations of vapour are superimposed on visualisations to create a warming and healing environment.

A custom-built content management system (CMS) ensures that the media façade can be operated as a single canvas as well as 226 individual canvases with unique pieces of high-resolution content. The CMS aggregates incoming touch events, effectively enabling individual screen content to respond to basic forms of user interaction. Supported content types include text, graphics, video and URLs, with options for administrators to distribute to an individual or to multiple bricks, and to schedule content playlists.

4 DISCUSSION

As a field that borrows insights from advertising, the media architecture discipline tends to describe project investment and revenue models by way of metrics that are commonplace in the DOOH industry [e.g. 14, 42], such as audience estimates relative to content and placement, and technical features of a display medium [59, pp. 110]. Our business case has shown that other, more diverse and qualitative benefits, may be sought in order to justify investment. In this section, we reflect on our observations and share considerations to support business case development for future projects.

4.1 Strategic Appeal of Media Architecture

The business model behind for-profit universities typically prompts expenditure on commercial advertising [7], such as in print media, online media and digital signage. But as most media façades such as *The Digital Bricks* afford little to no traditional commercial advertising opportunities, we must assume that funders and clients increasingly value media architecture for its strategic marketing and branding opportunities. It affirms that a variety of stakeholders are cognisant of onlookers' increasing blindness to public space advertising, as has been argued in previous research [46], and are therefore open to exploring the possibilities of non-traditional screen formats, technologies, content and interactions—considerations which are really essential characteristics of media architecture.

While we have no direct insight into the tacit assessment made by the client's decision-makers, the involvement from communications, marketing and curatorial teams in the operationalisation of the media façade suggests that the cost-benefits assessment involved consideration of multiple of the university's activity domains and objectives, and comparisons with the benefits that could



Fig. 5. Fragment of *The Digital Birthing Tree* content displayed on *The Digital Bricks*, paying tribute to First Peoples lands and knowledge. The fragment displays a collage of local gum tree bark textures. Content is spatialised across the entire wall canvas consisting of 226 LED screens and interlaced clay bricks. Image reused with permission from REELIZE.STUDIO.

be delivered through more established marketing campaigns such as through print, web, events or cultural programs. This open-ended view reflects the paradigm coined in Levitt's work on strategic marketing where essential questions centre around interrogating one's core business and resisting myopic tendencies when doing so [39]. For instance, a university's core business is commonly considered to be education and research. But a broader conception of the core might include research commercialisation (to deliver real-world economic and societal value), knowledge dissemination (through public engagement), and production of culture (to provide positive and generative campus experiences), or in other ways engaging with society at large. Explicitly linking the media façade to broader strategic goals encouraged the client to consider more fully how media architecture aids in these pursuits in ways that established marketing mechanisms cannot.

The strategic framing of the project prompted the client to consider *The Digital Bricks* as a long-term investment that supports multiple strategic objectives. In a shift away from established DOOH advertising, media architecture was considered an opportunity to further develop its brand differentiation and unique value proposition, and to demonstrate core values to target audiences. And by permanently embedding technology in its built environment, the university believed it could deliver an enduring uplift of its capability for attracting and connecting students, researchers, industry collaborators, and other stakeholders. Particularly the possibility of *The Digital Bricks* to deliver a platform for hands-on engagement by communities, and thus strengthen brand awareness and loyalty among the client's major target audience, provided a compelling justification for the investment.

Business Case Considerations. As an instrument that supports strategic branding, media architecture enables a client to differentiate from competitors by connecting with target audiences on an experiential, if not emotional, level. Advocates of media architecture projects should consider highlighting in their business case their project's particular, even unique, mechanisms and benefits for supporting the client's strategic priorities compared to other marketing channels. In our specific case, platform capability was identified to be a key differentiating quality.

Platform capability solidifies the intrinsic flexibility that media architecture affords as an enduring shared infrastructure for civic participation, for creative practice and artistic expression, for experimentation and innovation, for education and inspiration—issues that are all of strategic importance for the University of Melbourne. Through the delivery of flexible infrastructure that virtually everyone can access, continual changeovers in content, functionality and participatory programs become characteristic for the project's success and the clients' brand. At the most basic

level, content may easily change to communicate research breakthroughs or to announce a new educational programs by the university. More sophisticated capabilities offered by a media architecture platform is to experiment with new media formats taking advantage of the non-standard media architecture format [24]. Moreover, the flexibility of a platform opens up a range of innovative possibilities to engage the local community in science and research. While digital media serving as participatory platforms is not new [e.g. 60, 69], platform capabilities are particularly pertinent for media architecture where its integration into the built environment necessitates ongoing community involvement, long-term relevance, and meaningful connections with audiences. And crucially, the platform capability contributes to place-making endeavours that forge memorable connections between places and people, such as between the university campus and its users.

4.2 Identifying Engagement Benefits of Media Architecture

Our case study suggests that the innovative nature of media architecture requires creative approaches to describe and convey intended project benefits, as well as to establish methods that help in understanding and measuring their effectiveness. Schaeffler notes that benefits consist of financial and non-financial aspects [59, p. 169], with financial benefits relating to return on investment and sales uplift, whereas non-financial or ‘soft’ benefits encompass enhanced branding, customer satisfaction, response to calls-to-action, and ambience. As part of a business case’s assessment, the benefits will be compared to the cost to decide whether to pursue, adjust or abandon a project.

Non-financial benefits are a core component of the business case for *The Digital Bricks*, articulated through a range of engagement opportunities. This builds upon the extensive previous work that highlights the types of engagement enabled by media architecture, particularly in terms of encouraging new and rich forms of interaction between citizens and the urban environment, their peers and creative practice [e.g. 6, 9, 15, 16, 60]. Our case study in particular shows that the university deemed expenditure worthwhile given the benefits that a media façade provides in terms of campus experience, and enabling new connections around academic and cultural endeavours. Similar observations have been made in the context of the widely implemented *Percent for Art* scheme, which requires flagship urban developments to devote a percentage of their investment to the provision of public art [53]. While integrating art in urban developments rarely yields direct financial returns to justify investment, strategic value can originate out of the public’s engagement and resulting local distinctiveness, character enhancement, educational value and sense of place [23].

Business Case Considerations. The business case for *The Digital Bricks* highlighted major engagement benefits. While they summarise benefits envisioned by this specific project, we believe other engagement benefits may apply to other projects. For instance, one can imagine an ambitious scenario where a media architecture installation considered as part of a medical precinct aims to deliver health literacy benefits to its audience, in turn relieving pressure from the healthcare system. Or media architecture for a government building may aim to create societal benefits by promoting social interaction and encouraging civic discourse. While the applicability of media architecture is virtually unrestricted, the identification of engagement benefits is a vital step to seek buy-in from funders. In terms of identifying engagement benefits, our process reveals the importance of (1) participatory processes with stakeholders to uncover a wide range of project opportunities and achievable benefits, (2) exploring synergies between media architecture and the arts, particularly noting the non-financial value that public art creates, and (3) identifying potential partnerships that have the ability to illustrate financial benefits of media architecture. In the context of PD, media architecture and in particular its platform capability is a powerful enabler of engagement and participation in relation to exposure, investment, expression and sociality [11].

Realistically, some clients *will* expect media architecture business cases to articulate financial returns associated with engagement outcomes. Even in instances where these links seem elusive, we believe there are opportunities to borrow from related disciplines and programs to articulate potential causal pathways to financial returns. For instance, comparisons could be made with temporary programs such as urban light festivals and cultural fairs. Previous research has indicated the value of those programs on public mobility, consumer spending, and subsequent return visits [20, 41, 67]. It is obvious that no such program can operate for the entire lifespan of a media architecture manifestation. But we believe that they can serve as inspiration to establish partnerships with stakeholders across the surrounding cultural, entertainment and hospitality scene - stakeholders who may who may offer assistance with the estimation of financial impact.

4.3 Towards Engagement Benchmarking

Throughout the development of the business case for *The Digital Bricks*, we ensured that project activities, outcomes and impact would be measurable in order to articulate to the client the expected return on investment, and to enable a systematic evaluation of the realised benefits after project implementation. While the administrative requirements at the University of Melbourne did not mandate the inclusion of a TOC in the business case, the submitted information corresponded largely to categories, content, and logic of a TOC as described earlier in the paper. Here we distil key aspects of that business case to propose a TOC model that we refer to as a *Model of Engagement*.

Our proposed model is informed by common standards and guidelines for the development of TOCs [73] and reflects the vital importance of stakeholder participation to create clarity on a project's long-term goals. We argue that this *Model of Engagement* serves as an initial orientation for other media architecture projects. It also highlights how PD processes are vital to identify and articulate resources involved in media architecture projects. Participation of a multitude of stakeholders throughout the design and delivery of media architecture projects therefore ensures projects generate shared benefits [27]. The model consists of five components, i.e (1) inputs, including project stakeholders and technical and conceptual resources, (2) planned activities, (3) expected outputs, (4) intended engagement outcomes, and (5) the anticipated strategic impact of the project (see Figure 6, specifically tailored to *The Digital Bricks*).

- *Inputs*: factors that enable media architecture technology and programming to be implemented effectively. We distinguish between *stakeholders* and technical or conceptual *resources*.
 - *Stakeholders*: relevant individuals and groups that share an interest in the benefits that a project generates. While the list of stakeholders can be extensive, at a bare minimum this group includes decision-makers for securing investment, partners who will support development of content and specialised teams who operate the technology on a day-to-day basis. *The Digital Bricks* project envisioned a larger groups of stakeholders—including First Peoples advisory groups and the precinct community—to provide regular input, particularly for content curation and programming.
 - *Resources*: hardware and software elements that determine the design and functionality of media architecture, as well as the media content to be presented. Inter-dependencies between hardware, software, and content are important to consider. For the *The Digital Bricks* particular emphasis was placed on technical components that would enable interactivity and provide opportunities for collecting detailed data from audience engagement with the media façade for research purposes.
- *Activities*: the processes, techniques, and actions involved in the operation and maintenance of media architecture, and the development and delivery of related programs. Activities aim to optimally leverage the specific capabilities of involved stakeholders and value of available

resources. Individual activities are indicative of the opportunities (and constraints) that are revealed as part of the participatory design process with relevant stakeholder groups. Given the diversity of stakeholders involved in *The Digital Bricks*, the project's business case detailed collaborative and participatory activities.

- *Outputs*: the types and amount of programming produced and delivered, and of services provided to intended audiences are the *direct* result of the activities. The *The Digital Bricks* business cases provided ideas for measuring program reach and evidence of service delivery, including promotion of cultural programs and community participation.
- *Outcomes*: short- and medium-term changes in audience members' and other stakeholders' behaviour, knowledge, skills, and attitudes that result from activities and outputs of media architecture. Local citizens and current as well as future students were amongst the primary groups addressed by *The Digital Bricks* with the aim to foster a positive attitude regarding the relevance and societal value of research and innovation produced by the university.
- *Strategic impact*: long-term changes that are intended by way of media architecture, often changes in organisations or communities. This can include enduring changes in relationships among stakeholders and stakeholder capacities, but also financial outcomes. Impact in the business case for *The Digital Bricks* prioritised organisation-level issues, specifically on enhancing teaching and research capacity, student and campus experience, and brand equity.

Inherent to the *Model of Engagement* are evaluation mechanisms that help assess the success of *activities* and *engagement outcomes* in achieving intended *strategic impact*. Success of *The Digital Bricks* will be measured and analysed by way of a coordinated list of actions that involves qualitative and quantitative evaluation methods well-established within HCI and often adopted to evaluate media architecture projects, including interaction logging [6], social media monitoring [35] and studies of audience behaviour with and around the façade [e.g. 30, 33, 66]. Of particular relevance with respect to stakeholder engagement with media architecture are approaches from PD for analysing the enablers of participation and the intended effects in terms of output, outcome and impact [27]. Another example is the participatory gestalt framework consisting of five continua for mapping out the qualities of participation in relation to the degree of expressivity, exposure, investment, sociality and persistence that people experience when engaging in the interaction [12]. The connection between *The Digital Bricks* and the leading role that cultural and engagement partners play in the continuity of the project also indicates the appropriateness of additional methods from related fields. These will be applied to measure distal effects in terms of project impact, reach and quality. For instance, from the arts sector we borrow ethnographic and anthropological methods that capture the cultural nuances of audience behaviour through Impact Constructs [4]. Here, through quantitative responses, the dimensionality of intrinsic impact generated by an experience is captured, enabling attitude changes to be better understood [5].

Business Case Considerations. Long-term engagement with and impact of media architecture projects has not yet been systematically investigated. The emerging nature of the discipline as well as challenging access to commercial media architecture projects are likely contributors to this void. With multi-disciplinarity being at the heart of the media architecture discipline, it seems vital to adopt methods not commonly used in the discipline to evaluate and benchmark the success of engagement. In addition to HCI methods, one should consider methods from fields adjacent to the discipline and related to the particular case at hand. The systematic analysis of project inputs, activities and engagement outcomes is a helpful approach to uncover how strategic impact can be achieved and how success can be evaluated. While our model is an initial effort, we encourage the community to use our model as a mechanism to ensure funders and investors recognise the potential for diverse projects and activities, and identify the measurability of engagement. We

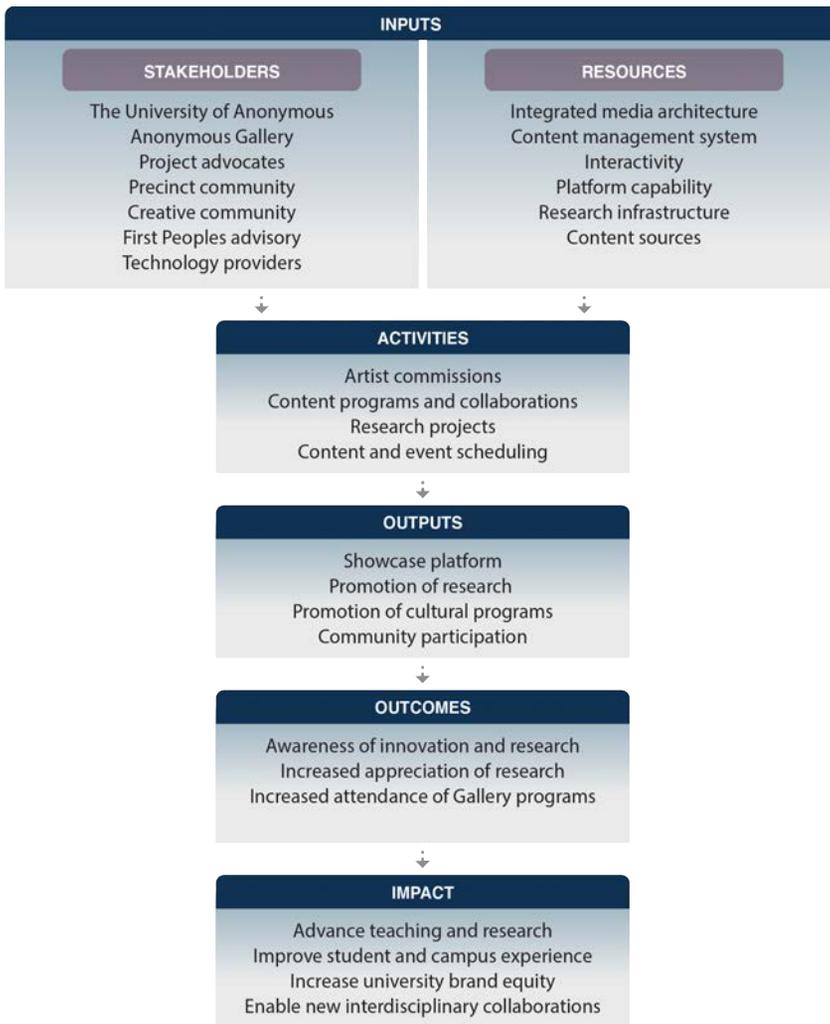


Fig. 6. Conceptual *Model of Engagement* to assist in the process of uncovering engagement outcomes and ensuring strategic impact is achieved.

recommend further use and application of the Model of Engagement to validate its usefulness and effectiveness, and to refine and identify additional evaluation mechanisms of relevance to the media architecture community.

To strengthen the evidence base for engagement benefits of media architecture, we also propose to develop a shared repository of engagement benchmarks, such as via the Media Architecture Awards project database³. Our proposal is based on recent calls in program evaluation research to intensify efforts to accumulate and synthesise a broader range of quantitative and qualitative evidence from diverse studies in order to provide a “*thicker understanding of how and why programs work across different settings, contexts, and times*” [38]. For the media architecture field, growing the evidence base by diligently documenting engagement effects, along with details on the installations

³<https://awards.mediaarchitecture.org/>

and programs that have produced them, would strengthen the plausibility and legitimacy of causal claims made in future business cases, and ensure uptake of groundbreaking, engaging media architecture.

5 CONCLUSION

With media architecture becoming a common occurrence in urban environments, new insights are needed to enable strategic success alongside operational performance. In this paper, we described the business case for *The Digital Bricks*, which set out to deliver a range of engagement benefits to the client rather than direct financial returns. With a large majority of media architecture projects either being publicly funded or not envisioning economic returns, our analysis of engagement benefits and benchmarks offers practical considerations to strengthen advocacy and uptake of media architecture projects whose content models seek to distance themselves from those common in DOOH advertising.

Our study is limited through the analysis of a single project, *The Digital Bricks*. As the media architecture discipline matures, a fuller understanding of what distinguishes successful business cases across a variety of contexts will become ever more essential. As a starting point we shared preliminary insights to support development of business cases for media architecture where non-financial benefits are envisioned. We highlighted the strategic branding opportunity that media architecture presents and ways to strengthen the argument in business cases and functional outcomes. In addition, we elaborated a process that can support the identification of a media architecture project's unique engagement opportunities for members of the public. And ultimately, we proposed a conceptual model to guide discovery of engagement benefits and project evaluation.

Shifting global economic conditions are likely to affect uptake of media architecture for years to come. As a result, insight into business cases is vital to ensure that clients understand the financial and non-financial returns their investment in diverse forms of media architecture is able to generate. The continuing and shared understanding of project ambitions, engagement benefits, and their evidence-based success are ideal starting points to further establish and develop our field.

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