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## URBAN DIGITAL MEDIA

*Facilitating the intersection between science, the arts and culture  
in the arena of technology and building*

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**Abstract.** The research presented in this paper investigates ways of providing better design applications for technologies in the field of Urban Digital Media (UDM). The work takes an emergent approach, evolving a design strategy through the early engagement of stakeholders. The paper discusses research in a design-led creative intersection between media technology, culture and the arts in the built environment. The case study discusses opportunities for the enhancement of a university campus experience, learning culture and community, through the provision of an integrated digital presence within campus architecture and urban spaces. It considers types of information architecture (Manovich, 2001) and designs for use in urban settings to create communication-rich, advanced and interactive designed spaces (Haeusler, 2009). The presented research investigates how to create a strategy for display technologies and networked communications to transform and augment the constructed reality of the built environment, allowing new formats of media activity.

**Keywords.** Urban design; outdoor digital media; information architecture; multidisciplinary design; augmented reality; media facades.

### 1. Introduction and research background

#### 1.1. MOTIVATION

Historically, the built environment has been based on centuries-old materials, construction techniques, and static functionality. Traditional buildings invariably do not change, respond or adapt: they are following an alloplastic mode

of operation, are determined and static (Goulthorpe, 1999). However, the recent history of the built and urban environment is, to a great degree, about advances in building technologies (Banham, 1984). Late 19th and early 20th century developments in new materials such as steel, glass and lightweight concrete led to a revolutionary transformation of cities and buildings. New complex systems and infrastructures such as elevators, air-conditioning and heating made it possible to inhabit these new spaces.

Contemporary requirements also include adaptability, new modes of communication and transformative environments. Cities around the world utilise the current generation of outdoor urban digital media. These typically include video displays used for commercial advertising. A few cultural buildings have animated art and information media content as part of their fabric (Haeusler, 2009). As cities grow, outdoor digital media has the potential to become a ubiquitous part of our urban environment. There is great interest in the science, engineering and design communities about what will inform advanced urbanism and buildings of the future (Addington, Michelle and Schodek, Daniel, 2005).

Recent developments in advanced digital design software, broadband media and networked design, manufacturing and production processes are now transforming design tools, working concepts and the constructed reality of the built environment (Massumi, 2006). Built environments can have capacity for adaptation and interaction with their users as a result of the augmented technologies built into their initial conception, design, development and eventual operation (Manovich, 2001).

## 1.2. DEFINING RESEARCH QUESTION

The example of this shift, illustrated in the paper, is centered on the implementation of digital media into an inner city university campus – the University of Technology, located centrally in Sydney, Australia. The presented study aims to consider and answer this key question:

What are the immediate and the future opportunities for a university, as architecture and urban design evolve to take advantage of interactive Urban Digital Media technologies?

The paper first introduces the methodology applied for this research, followed by analysis of interviews, workshops and context studies that presents the backbone of a case study conducted in 2009 as a commission by the university; then work by others to outline the significance and position the research. It concludes with a discussion of the research.

## 2. Methodology

The research evolved a consultation-orientated emergent strategy, which was favored over a theoretical hypothesis-orientated approach due to the criticality of interactions of the university with its environment and users and thus the need for immediate consultation to inform direction.

It acknowledges that such a process is based on a dynamic mode that inhabits a complex model of actions and reactions (Senge, 1990). Due to applying system thinking, which does Senge define as a process of predicting, the outline of the research method is described in a chronological order following the basis that anything will influence the following steps.

Based on the starting principles, a set of peer information, feedback and ideas initiated a strategy for the research. These evolved from the comparative foundation study, interviews, case studies and brainstorming. The strategy evolved a series of frameworks as scoping categories for project ideas, which can subsequently lead to project applications. Subsequent project outputs will be benchmarked over time using a set of global key performance indices (KPIs), created in consultation with stakeholders. The multidisciplinary evaluation KPI metrics comprise design, technological, environmental, social, economic and cultural criteria.

In detail, the research commenced with a transdisciplinary studio where students were asked to provide foundation studies, case studies and first design sketches. Based on this foundation the authors continued a detailed study of the inner city campus of the university, as well as the building, information technology, social and cultural infrastructure of other universities, enterprises and cultural institutions (such as museums and event spaces). Furthermore, focusing on international case studies, the research continued with interviews and brainstorming with different stakeholders. Four different stakeholders for these sessions were: (1) senior management staff such as vice-chancellors, deans and professors of the university; (2) university staff such as technicians responsible for IT and network infrastructure, as well as marketing staff; (3) industry experts such as event managers, designers, technology experts, curators, amongst others – again on a national and international level with workshops in Sydney and London; (4) students of the university from all faculties at undergraduate, graduate and postgraduate level.

The university is aiming to position itself positively in the following manner: (1) in terms of location in regards to interaction with the city, country and globally; (2) in terms of competing with universities that have a technological focus, locally as well on a national and international level; (3) providing the university with standards and technologies of the 21st century for teaching and learning, and creating a vision for a campus and campus life

in the near future; (4) incorporating the university strategic plan to advance knowledge and learning to progress the professionals, industry and communities of the world.

In the chosen research methodology, stakeholders expressed their ideas, visions and outlooks on how a design-led creative intersection between science, culture and art in the arena of technology and building could be achieved. This consultation involved around 100 people, 50% university staff, 25% students, and 25% external experts and other stakeholders. To ensure a deep investigation, despite the time consuming aspect of this approach, questionnaires were avoided and the consultation was interactive and participative in all instances. The research methodology used facilitated both strategy and project ideas for the enhancement of the university experience, learning culture and community, through the provision of an integrated digital presence within the campus architecture and urban spaces.

### **3. Case study**

#### **3.1. INTRODUCTION**

In February 2009 the first step – the transdisciplinary studio, based at University of Technology Sydney, with a mixture of undergraduate and graduate students in architecture, building and design – was run to determinates detail of the institution to be researched. Consequently, later in 2009 the two authors were commissioned by the Chancellery's Planning Group Committee – the body responsible for all new and refurbished building development on the campus – to conduct research that would enable the university to be one of the first in integrating digital media into the campus structure.

At the core of this work was the aim of finding better ways of showcasing, enhancing and encouraging the creativity, vibrancy and energy of the campus users and visitors; catalysing and enhancing a kaleidoscopic rich mix of academic and campus life. The focus of this study was to look at the opportunities for integrating urban digital media (UDM) into the campus. With a \$500M AUD comprehensive campus development underway over the next 5 years comprising new buildings and building refurbishment, the timing for this research was perceived appropriate by the university's chancellery.

#### **3.2. REPORTING ON THE STUDY**

##### *3.2.1. Foundation studies – student elective 'Esemplastic'*

Prior to the research commissioned by the chancellery, the authors carried out a foundation study in the form of a 7-week multidisciplinary student elective

for graduate masters: architecture; and undergraduate: property management, interior design, and visual communication. The elective was titled 'Esemplastic', which is defined as: the power to shape disparate things into a unified whole (Coleridge, 1817). This elective benefited from the input and advice of many university managers and their vested interest in this study. The project criteria were based on a series of advocacies, i.e., design, social, technocratic, political and cultural advocacy.

The elective was formed around a series of four tasks, here explained in four points, each leading towards developing a site-wide urban media strategy; each demonstrating the solutions in a proto typical format. (1) 'Vox pops' – video interviews in which interviewed students and staff could express their view of the campus by responding to question regarding what improvements could be imagined when considering with mobile phone, internet, screens, GPS, RFID tacking, etc. (2) Provide an example of existing Urban Digital Media as a case study, while focusing on public outdoor screening, cultural events and micro market places, to name but a few. (3) In order to gain an understanding of the university context, students where asked to evaluate the existing and proposed master plan of the university and to consider strategically what they would do to enhance these places and spaces, as well as the campus experience. (4) Bring all the interviews, brainstorming and concepts into a design sketch to express and illustrate the ideas for an urban digital media intervention.

All these points led to a development of students' design visualisations, along with argument, supporting information and narrative. The aim of the presentation was an integration of all above points into a diagrammatic design, considering site specific data and a revenue and cost model for the operation.

### *3.2.2. Urban digital media research*

Following the appointment of the authors by the university, the research went into its second stage where the documents collected and provided by students in the first stage of the research were reviewed and then extended in level of detail. Based on the previously described methodology, four steps were undertaken in doing so: (1) analysis and understanding of campus; (2) analysis and research of institutions within the field of enquiry; (3) workshop and discussion of peer review panel and (4) interim review panel for evaluation feedback.

## **4. Seven frameworks and KPI's**

The development of six core strategic frameworks, plus a seventh auxiliary

framework (relating to signage and information, and not covered in this paper), originated through the analysis of ideas, wish lists and strategic suggestions from the consultation exercises. The aim was for any idea to fit within at least one framework. This was demonstrated with over 100 project ideas that were generated during the consultation. Each framework has a set of criteria that any idea must meet. Taken collectively, the frameworks ensure that the campus will be able to benefit from a full and balanced range of UDM applications. The frameworks will become populated over time and brought to life by stakeholders in various locations around the campus. The six frameworks are described, all of which have a highly socio-cultural aspect:

**Creative commons:** students working in temporary spaces that they have ownership of collaboratively. Located in visible public places, these areas can be made secure. Ideal for outcomes in the arts and design.

**Transydney:** also creative, a large scale media screen that can be used for events to attract people from across Sydney: student shared work, live global lectures, or simply movies. Outdoor space with provision for 1,000–2,000 people.

**Micromarketplace:** a business-like layout of screens, podia and meeting spaces that allow students to engage with industry and promote their work in mini tradeshow formats, helping them set up microbusinesses while still at college, or offer consulting freelancing. The university acts sometimes as a broker, sometimes as a host, for the industry partners.

**Playsure:** mixing up social play and leisure, this framework has a focus on IT for entertainment and engagement: sound system, VJ setups, tiered soft seating for informal talks, plus kids video and game areas.

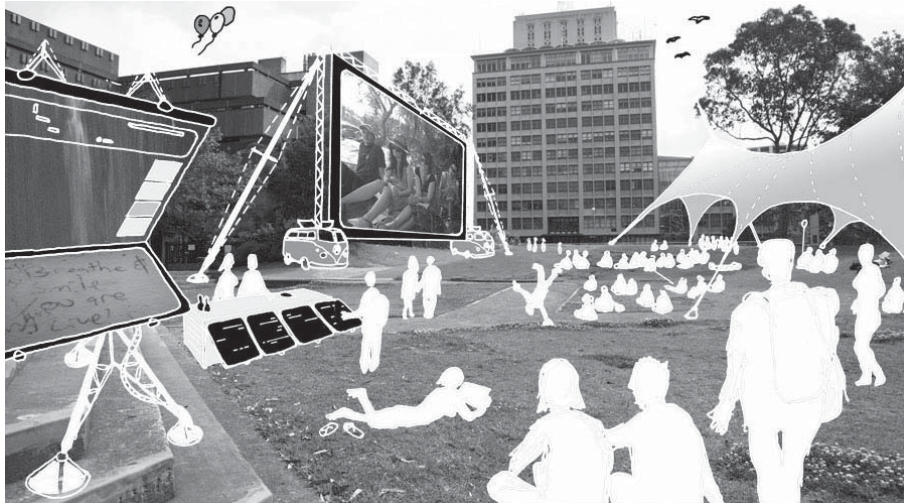
**Social academy:** designed for specific outreach programs to engage city locals and visitors, particularly aiming for a mixed ethnic and demographic participation – workshop and event activities will have programmed targets in this sense.

**Researchtheque:** intended for research collaborations, the researchtheque is where research work can be made visible and have public or audience participation. Ideal for visualising and participative science. Located in very visible places.

An example of a framework project application is shown in figure 1.

Aside from physical space, each framework requires IT and AV equipment of fairly typical format: large screens, projectors, wireless, power, some computers, and various types of bespoke furniture/fit out.

These frameworks have a certain resonance with Cedric Price's ATOM project and his Fun Palace from the 1960's (Price, 2003). However, in the campus project, the proposal is for specifically programmed spaces as opposed



*Figure 1. Transydney framework: a project application illustration, showing a giant outdoor media screen, terminals for logging student work for sequenced group viewing, and a satellite workstation for production and scheduling of content. Today's screens can work in daylight.*

to generic spaces such as the Fun Palace. This was informed by study of earlier campus interventions that indicated programmed spaces with designed configurations were more readily understood and therefore populated by stakeholders, and hence more vibrant. Programmed UDM spaces were also widely proposed in the work of architect Ron Herron from the 1960's to 90's (Banham, 1994), a member of the seminal Independent Group and Archigram collaborator of the period (Cook, 1999).

The KPI's that span across all frameworks and are monitored over time relate to: funding targets from revenue; sponsored media airtime; green energy sources; maintenance costs; teaching and learning benefits; stakeholder engagement; and media content breakdown by audience. For example: 30% of energy use will come from green energy source, and 30% of media content will be student generated.

The evaluation of the KPI's will take place over 3 years, with adjustment possible during this period. Evaluation will be quantities for numerically measurable aspects, and through stakeholder surveys for the more qualitative aspects. Effectively, the KPI's represent a commitment to the campus stakeholders to ensure that initial intent is met over a continuing delivery period. After 3 years, the KPI's will be fully reviewed with stakeholders and a new set of KPI's may be used.



## 5. Other case studies in dictating UDM significance

### 5.1. UBIQUITOUS CITY SEOUL

Since 2007 the central Korean government has been implementing a variety of policies to build a u-Korea. The project is an effort to showcase knowledge information and to enhance the competitiveness of the information industry. It sees the city as a holistic and intelligent system of ubiquitous technologies. According to Choi, a ubiquitous city can be developed through three stages, which are also its three foundational qualities: real-time data gathering; context-awareness (in processing the gathered data to provide the optimum solution within the given context); and finally, ‘autonomy in its operation’, turning the city into an intelligent and autonomous network system (Choi, 2008). The first and foremost strategy of the IFEZ (Incheon Free Economic Zone) Authority was to create demand through advance investment in public projects. One of them, ‘Tomorrow City’, is expected to serve as the world’s first state-of-the-art u-City ([www.koreaitimes.com/story/4371/leading-global-u-city](http://www.koreaitimes.com/story/4371/leading-global-u-city); accessed: October 2009). Here according to *Korea IT Times*, three free ubiquitous spaces – access free space, content free space, and data free space – are built to provide visitors with free opportunity to access, use and exchange content and data. This kind of digital architecture will absorb concepts of augmented reality, GPS location system and ubiquitous robot technology.

### 5.2. FEDERATION SQUARE MELBOURNE

Though achieving little recognition on the official homepage of the Federation Square ([www.fedsq.com/index.cfm?pageID=29](http://www.fedsq.com/index.cfm?pageID=29); accessed: October 2009) the outdoor LED screen attached to Transport, a distinctive southern entry marker to both Federation Square and Melbourne City, functions as a part of the public space and helps to draw crowds (Haeusler, 2009). The plaza in front of the screen has been designed in such a manner that the LED screen is its center. Due to the positive respond of the public the screen got an upgrade from 38m<sup>2</sup> to 65m<sup>2</sup> in December 2007. The screen is curated by an own studio manager and lists past, present and future events on a homepage, where one has the possibility to view a program guide and browse the archive for previous events.

### 5.3. CLOUD COMPUTING

Cloud computing may represent a “missing link” for UDM. Although cloud computing (Knorr, 2008) is not a physical intervention in architectural space, taken in conjunction with pervasive digital networks (eg: wireless internet)

cloud computing can be very advantageous.

How does cloud computing differ from subcontracting UDM computer needs to a mainframe operations model? To answer, the key advantages of cloud computing that contrast with this scenario are: (1) virtually limitless ability to scale both data storage and processing power at short notice, (2) costs are minimal as the revenue models used by the cloud computing providers are based on advertising and not extensive charges, (3) the large user base that shares any given cloud allows economies of scale and greater resource commitment by the cloud operators for innovation investment and upgrades that are shared benefits among the many clients, (4) security against damaged, theft or breakdown of the actual hardware which is mirrored on multiple sites remotely, and (5) quick setup and take-down times for UDM installations that simply need a connection to the cloud.

Currently, the global leaders in cloud computing are: Google, Apple and Microsoft (The Economist, 2009). The largest organisation to switch to a cloud model in 2009 was the UK business Rentokil Initial, with 35,000 employees using Google services (The Economist, 2009).

### 5.3. CONCLUSION

Two examples show an interest in augmenting public spaces with digital technology. The motivation for both locations can be considered as similar. The aim of both is to combine signage, spaces, and technology to create vibrancy and allow social networking. Cloud computing is not location-based but it offers essential advantages for UDM.

## 6. Conclusion

The technology components are just a part of each framework: installed screens and other hardware are meaningless without being part of a designed (i.e., space, location and orientation) and programmed (i.e., activities, content and schedules) environment. Successful integration of technology through design and programme into architectural space also reduces the risk of techno-clutter or digital favelas springing up, being visually offensive and compromising other space functions.

Flexibility within strategic frameworks is important. Evidence for the success of the projects will in the end come from user and stakeholder feedback on such criteria: failed project applications will be demounted and reconfigured for use elsewhere. So, the applications can learn from failure over the next 5 years as the university implements the UDM strategy.

Technology is a facilitator and design a catalyst, provided they are used

in well-programmed space. To facilitate the intersection between science and culture, technology must have fitness for socio-cultural purpose. Human physical social networks and culture can still be considered to be the main drivers for this technology.

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