

EXPANDED URBAN MEDIA: FROM DISCRETIZED SOCIAL COLLAGES TO CORRUGATED SOCIAL BRAIN

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Abstract

Big data, the mobile Internet, social media and the Internet of things (IoT) generate more information than ever but the aggregation of social intelligence remains far from realising its potential. Two exemplary works, *mediated_moments* and *plasma_flow*, exhibited at Beijing's China Millennium Monument Museum of Digital Arts in 2012 model the scalable potential of urban media to weave itself into the city's social fabric, mapping and visualizing individuals' thinking/intelligence onto a mixed-reality urban canvas.

Keywords

Digital media, Smart Cities, China, urban space, data visualization, transcultural

Context and background

Saturated in digital air, cities cluster around resources representing various interests and agendas, creating inevitably complex systems. Big Data, the mobile Internet, social media and the Internet of Things (IoT) [1] are generating more information than ever, but the aggregation of social intelligence remains largely unexploited and is far from realising its apparent potential. The race to become a "smart city" has intensified across the world as cities vie to take advantage of the currency and availability of open data and new technologies to offer the potential for new services and innovation.

Early approaches to the Smart City concept have tended to be couched in terms of the purely technical at the expense of the human experience of living in cities. More recent understandings of what makes a smart city have focused on expanding definitions of 'smartness' to include knowledge cities, digital cities and eco-cities [2]. Mindful of the dangers of utopianism, overstatement and idealisation of what digital technologies might actually allow humans to achieve, this paper aims to stimulate reflection on the potential of expanded urban media to move beyond the entrancing imagery

presented at art and light festivals and on architecture world wide, and instead try to engage media savvy citizens in constructive ways.

Every corner of our everyday life is now mediated. However, we lack an understanding of how to map 'the wisdom of the crowd' in a manner that all stakeholders can use to help facilitate more livable, sustainable cities. "Smart cities are cities of smart people. We must make sure we are open to finding ways to put this connected intelligence to best use..." [3]

Moreover, globally, unprecedented levels of interconnectivity imply there is considerable potential for people living in cities around the world to collaboratively address critical problems such as rapid urbanisation, air quality, food and water security, and aging populations. There remain serious challenges to the development of a shared vision about what more sustainable futures might look like [4]. With increasing attention from researchers and designers occurring worldwide, the deployment of digital media in cities *should* ideally be evolving toward an urban media that translates into constructive community and cultural engagement that benefits and empowers people beyond the banality of advertising [5].

The transcultural collaboration presented in this paper makes no claim for solving these myriad challenges, but offers reflection on prototypes that attempt to explore how curated social collaboration and urban informatics might create new forms of transformational public space. It is beyond the scope of the paper to provide a comprehensive analysis of the 'Smart City'. Rather, while referring to instances of recent innovations situated in China, we focus our attention on two works, *mediated_moments* and *plasma_flow* exhibited at the GeoCity Smart City International Information Design Exhibition at Beijing Design Week during 2012. We conclude by briefly discussing a research platform that has emerged from the ongoing development of these projects. Although a work in progress, the platform consists of a collaborative framework (*augmented_studio*) and an Interactive Media Platform (IMP) for designing participatory urban data visualisation for deployment in public space.

Hespanhol and Tomitsch cite McDONALD, McCarthy et al. in observing that, "recent popularisation and widespread adoption of electronic displays, com-

bined with the increasing affordability of tracking technologies like sensors and depth cameras, has created new opportunities for creating proactive environments" [6]. Bernstein, Klein and Malone [7] suggest that networks of humans and computers provide a capacity for accessing collective intelligence in transformative ways useful to education, industry, government and the arts. Leveraging the communication and processing capacity of networked computers, combined with human ingenuity and distributed cognition, our systems "are now routinely able to solve problems that would have been unthinkable only a few short years ago" [8]. Aggregated geo-based information (mapping, geo-data, text, image, video, social media, and real time data) enable access to services that provide a more holistic perspective on urban ecosystems and our information societies.

There are now many instances of this emergent "'global brain' collectively representing the contributions of many millions of people and computers" [9]. Re-modulation of relations between people, and between people and machines, through design-led innovation around dynamic media woven into the urban fabric [10] will go some way to fostering unprecedented idea ecologies and higher levels of social sustainability, social wisdom and wellbeing. Social ingenuity reflects a natural spontaneity present in



Fig. 1: The Weibo Event Visualisation Analysis System, aka "WeiboVA Project" developed by Peking University Visualisation and Visual Analytics Group.

our cities. It represents society's intuitive reaction toward social, political and economic issues and conflicts without a designed skin, featuring no overdubs, effects or EQ, and is a pure, undistorted acoustic social sound and a viable social resource.

Visualising 'Smart' Beijing

We are also living in the era of rapid urbanization, a phenomenon of which China is an extreme example. With this comes many problems, including traffic congestion, pollution and overcrowding. The Chinese megacities have a particular significance for the planet given current trends within China and the forecast for future urbanisation. Within this complex, the immense scale of China's uptake of social media is illustrated by Sina Weibo reaching 100 million users in 1.5 years, compared to Facebook which took 3 years to achieve similar results [11]. Despite shifts in the market to other brands, in December 2012 Apple announced China sales of its iPhone 5 had reached two million units in the first three days of official trading [12]. In China, 66% of smartphone users make daily visits to social media compared with 57% in the UK. The percentage of users sharing data to social networks is 59% in China compared to 21% for UK users [13].

In order to understand the potential of this increasingly ubiquitous mediation, some Chinese artists, designers and data engineers are exploring forms of communication more suited to the paradigm of distributed and networked cognition.

Developed by PKUVIS, Peking University's Visualisation and Visual Analytics Group, The Weibo Event Visualisation Analysis System, aka "WeiboVA Project" [14] is capable of creating a visual representation of 'tweets' from a single event, a keyword, or a specific user. The system consists of two interfaces: a web-based online visualisation interface for public users and an offline visual analytic system providing additional analysis functions. The online interface provides an intuitive and powerful 'retweet' tree visualisation to inspire user creativity. The offline system collects public users' analysis results and is able to visualise and interpret Weibo events to deeper extent.

The visualization [Fig. 1] shows how a critical event-based Weibo 'tweet' (the center point in the diagram) spreads throughout weibo-sphere. Each node represents a retweet. The line represents the relationships in the information flow,



Fig 2: The Skyscreen is 220 m long and 27 m wide and is suspended 24 m above a plaza between two new retail centers. (Photo: ©2013 Florian Frey // studiobaff.com)

revealing how the initial 'voice' is cascaded through the network and identify the critical 'side influencers' beside the main figure (see the top left and bottom left small circles clusters). The visualisation organises the chaotic noise of Weibo voices into social patterns through which we can navigate and "try to further 'smartly' channel the generation of social energy and motivate it into positive strands." [15].

Operating at the scale of public space, and an exemplar of the ubiquity of urban screens in urban China, 'The Place' [16] is a new retail destination in Beijing which features a suspended LED display with a screen area greater than the size of a soccer field. The Skyscreen [Fig 2] is 220 m long and 27 m wide and suspended 80 feet above a plaza between two new retail centers. The screens have the capacity to display vast video games, broadcast live and televised events, and advertise products. The potential for social interaction has been tentatively explored in events where visitors to the site have been able to upload photos of themselves or their friends.

China Millennium Monument Museum of Digital Art (CMoDA) - GeoCity Smart City

Opened in December 2011, the China Millennium Monument Museum of Digital Art (CMoDA) in Beijing is China's first museum for digital art and plays an important role as a key cultural incubator. Core to the museum's mission is the fostering of a contemporary international creative industry relevant to the emerging needs and challenges facing Chinese society. CMoDA exemplifies the prescience of China's move from 'made in China' to 'created in China'. The cultural and creative industries have been embraced domestically as pillar industries and are now considered key drivers of

the Chinese economy. As such, they are enjoying considerable attention. By joining forces from media, art, technology and science the museum's agenda is to look at how information design might explore, showcase and apply Big Data to unveil new possibilities for cities and society.

This has led to the museum fostering an approach that is welcoming of the public, responsive, adaptive, cross channel, participatory, future friendly, and importantly - ready for the unknown. The CMoDA response has led to The GeoCity Smart City International Information Design Exhibition, an initiative comprising an annual exhibition and a workshop and symposium program designed to create a platform for international collaborative and interdisciplinary research, dialogue and innovation in Beijing.

mediated_moments and plasma_flow

In 2012 Australian artist Brad Miller, creative producer and sound designer Ian McArthur, software developer Adam Hinshaw and Shanghai-based social media specialist Paul Adams collaborated with CMoDA's Deputy Director and Chief Curator Yang Lei to create two spectacular large-scale responsive data visualisations for the GeoCity Smart City Exhibition at Beijing Design Week. The two installations, *mediated_moments* and *plasma_flow* [Fig. 3] used very different approaches to the interrogation and visualization of data gathered from social media: they used crowdsourced social data to draw attention to issues related to mobility in Beijing.

mediated_moments is part of a series of installations produced by Miller, McArthur and Hinshaw to engage with folksonomies and visual patterns via the

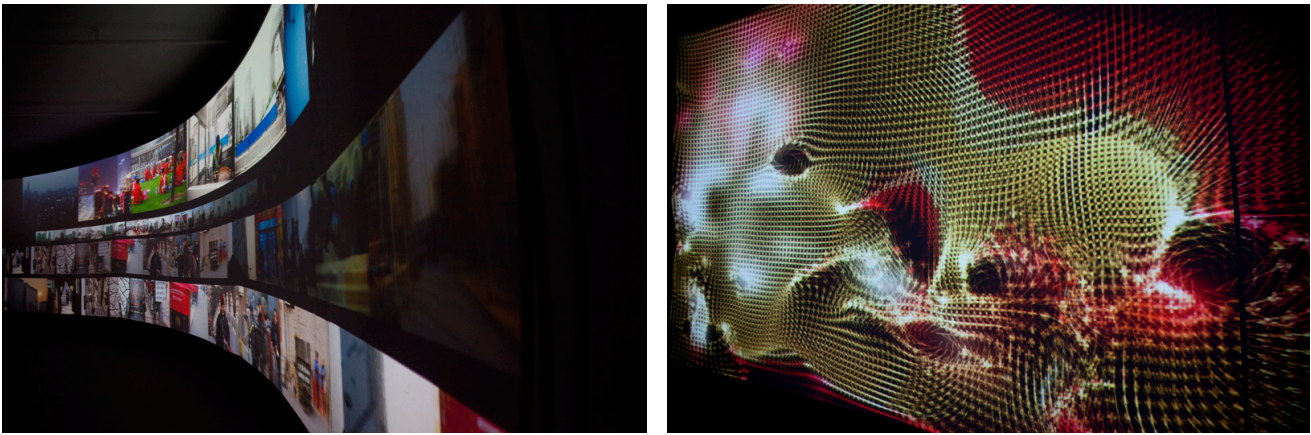


Fig 3: *mediated_moments* (left) and *plasma_flow* (right) as exhibited at the China Millennium Monument Museum of Digital Art 2012, Photo © Brad Miller (2012)

social media image repository Flickr. The work is a multi-channel visual and audio installation which renders a large quantity of digital images depicting information systems, communications, transport and the built environment of Beijing. The results of queries to the Flickr repository are activated using machine-vision technology mounted in the ceiling. *mediated_moments* has been described by Miller as a memory machine of sorts [17]. It tracks our relationships with people, things, places and scenarios via the use of streaming photographs and an algorithm developed to structure the flow of images unfurling in horizontal film-like strips, sometimes in different directions, triggered by the movement of a viewer, under sensors, in the exhibition space.

plasma_flow employs an entirely different model. It deploys fluid dynamic simulations [18] to visualise somatically engaging relations with the apparent flows of data and virtual others (when no live somatic input is available) defined by location and/or subject metadata scraped from the Chinese micro-blogging service Weibo with search queries on the thematics of the exhibition. The iteration of *plasma_flow* exhibited at CMoDA worked with the objective of graphing geo-relationships between current Weibo interactions into the *plasma_flow* virtual space. Tweets originating from the Beijing area are transposed, using location and time difference, into a directed force that is applied to the fluid simulation. The resulting movements are blended with those of the local participants [19].

The flow of data in these works is accompanied by a sonified audio environment. This is constructed from fragments of digital noise, field recordings and audio compositions [20] and processed

by a sound patch (granular synthesis) that segments and reassembles them into new configurations, and responsive juxtapositions [21].

The emergence of *mediated_moments* and *plasma_flow* points to the scalable potential of urban media to merge into the urban social fabric, mapping and visualising individual's 'unconscious' thinking/intelligence onto a mixed-reality urban canvas. In the case of *mediated_moments*, the crowd generated content forms a new genre – "city film" – city story telling by the city dwellers themselves. The mobility of the city triggers the filmmaking and play back in a live, or 'living film' process. By contrast, *plasma_flow* creates a magic mirror to augment both physical mobility (locative audience movement) and online social media traffic (Weibo).

The *augmented_studio* framework and Interactive Media Platform (IMP) Toolkit

Both works described represent the nexus of a collaborative framework (*augmented_studio*) and an Interactive Media Platform (IMP) consisting of network, tracking and display software, middleware and hardware. The development pathway has instigated an ongoing research trajectory that explores the potential of participatory processes and responsive data visualisation to create accelerated communication pathways for building shared vision around complex problems in urban environments.

The *augmented_studio* IMP can be used to document, facilitate and display design process and outcomes, creating: (1) a studio space that draws on a database of images, sound and videos to display content as an immersive environment and (2) an interactive exhibition platform. Stakeholders using the

augmented_studio framework are able to create, tag and upload content to a Flickr database. The content is then available for use in a curatorial process that can be deployed at multiple scales, forming a dynamic responsive data visualisation. As part of the framework the *augmented_studio* researchers have initiated middleware we call FlickrTool, which allows for broader sets of search queries targeted toward visual data with Creative Commons License attributes [22]. Therefore, *augmented_studio* is the process component - as the facilitator of a conversation about a problem space - and the IMP Toolkit is the exhibition component that creates a responsive spectacle.

Our testing and deployment of the *augmented_studio* framework, together with the IMP Toolkit, reveals that it augments the development of usable common understandings despite language and culture differences through intensive sharing of media. This implies media 'objects' establish synergistic collaborative tools for co-linguaging 'joined-up' design processes [23] in participatory, intercultural and co-creation contexts. The responsive and immersive nature of the IMP forms an informational layer [24], producing a multi-agent visualisation system. This is critical to mapping and evaluating the techniques of collaborative interaction (which is already heavily mediated at all levels by media technologies) and allows for the formulation of a range of novel participatory co-design and Metadesign [25] strategies and future-shaping innovation initiatives. Substantiated through the theoretical discourse of the image as boundary object [26], images and machine vision can be seen in combination to form a dynamic, networked environment for data-sharing and ideation. This

becomes a site where disclosure and individual and collective narratives remake “the world - not as data, but as modulation” of relations between people” [27]. Re-modulation becomes the basis for creative discourse with dynamic screens (or projections), allowing for ongoing iterative transformation and recursive engagement.

Images allow us to tell stories and in turn to see and hear the world in new ways. Eppler [28] argues there are “crucial and multiple roles of images for collaboration, whether they are conceived as visual boundary objects, prescription devices, visual non-human agents, trading zones, epistemic objects, or simply collaborative graphics.” The power of the image includes a diverse and persuasive facility to focus the attention of a group, identify conflict or congruence, reveal implied knowledge and past experiences, and highlight new or unfamiliar ways of seeing and being in the world. *augmented_studio* provides a prototype for a sophisticated scalable open networked technology that supports crowdsourcing, networked interdisciplinary and collaborative co-design, dialogue and immersive mapping of collective thinking about the city. Murphie proposes that, “*augmented_studio* has potential to ... re-modulate participatory engagement with complex problems, facilitating relational transformation, collaborative attention, and the building of trust via a sharing of experience/memory in order to, quite literally, lead to different, cooperative futures” [29].

***augmented_studio* as a model for expanded urban media**

In the context of *augmented_studio* research, ‘participatory’ refers to open and social co-creation processes including crowdsourcing and distributed socially derived content development. As defined at the Central St Martins Media Architecture Conference 2007, media architecture (the intersection of media and architecture) describes developments in display technologies, building materials and approaches to architectural façades that are creating opportunities for dynamic “new forms of hybrid architecture, that break away from existing conceptions of surface, structure, lighting and moving imagery” [30].

Situated at the intersection of these conceptual drivers lies the potential for a networked and participatory urban media (curated or real time) and a more participatory and interactive notion of public

space. As noted by McGuire [31], despite being deployed historically primarily as a means of advertising, more recent conceptions of media architecture suggest the potential for developing “innovative tools for exploring new modes of social interaction and cultural exchange.”

By working in more ‘joined-up’ ways [32] there is greater capacity to develop more common ideas on what sustainable ways of living, trading and innovating productively might be like. However, as Eppler describes, our still rudimentary understanding of how images might facilitate shared understandings or form the basis for decision-making amongst different sociocultural groups and stakeholders is a challenging limitation. Even when framed as boundary objects, we “are still far from rigorous advice on how to make sound use of images (and by inference visual data) as knowledge-intensive communication catalysts” [33].

The rapidly developing Chinese context presents research challenges that will stimulate the application of *augmented_studio* tools and processes for conceptualising how to encourage ‘idea ecologies’ in complex Smart City contexts. Perhaps the most urgent of these is its potential for being misunderstood by those not experienced in interpreting the way the culture describes and understands itself. Appropriately supported, *augmented_studio* will continue to research and fast prototype new participatory urban media ideas by leveraging the *mediated_moments* and *plasma_flow* platform. CMoDA are devoted to participating in the *augmented_studio* and to making an urban media ‘engine’ to push the confluence of these ideas further to create more participatory immersive, responsive public space. By optimising synergistic local, regional and international collaboration and co-creation, a curated, synchronised mode of participatory urban media can potentially channel and motivate the fragmented interests of social intelligence into strands of positive energies with a driving force and influence.

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