PUBLIC DATA VISUALIZATION: DRAMATIZING ARCHITECTURE AND MAKING DATA VISIBLE

Dave Colangelo & Patricio Davila

In this paper, we explore emerging modes of digitally-mediated participation in urban space that engage bodily and architectural relationships with data rich environments. We contend that the combination of data visualization, public space, and digital display technologies represent an important aesthetic and technical challenge that engage new dimensions of presence in a social and material environment characterized by networks and data.

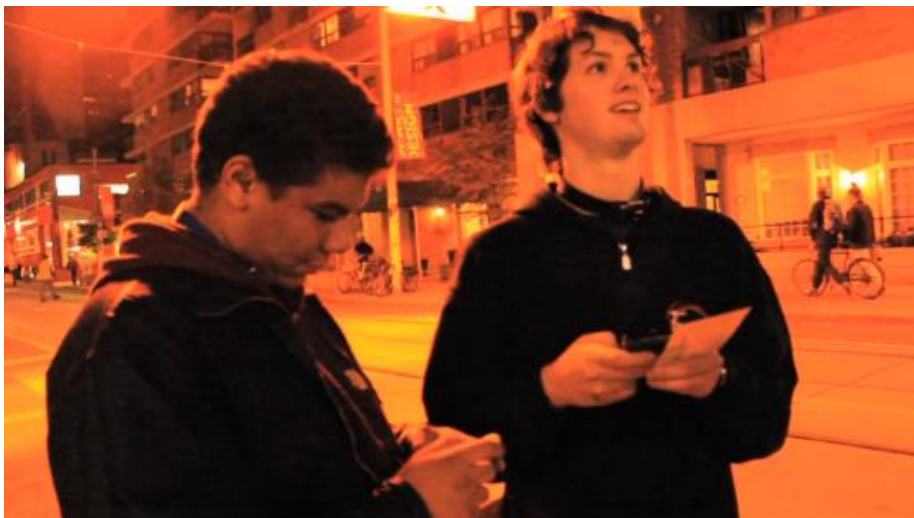*"Fig. 1. E-TOWER (tower view), Oct 2, 2010, Dave Colangelo and Patricio Davila, Installation.*

Fig. 2. E-TOWER (participant view), Oct 2, 2010, Dave Colangelo and Patricio Davila, Installation

Fig. 3. Archives of Ontario: Dramatizing the Archive (projection area), Dave Colangelo and Patricio Davila, Installation.

Introduction

In this paper, we explore emerging modes of digitally-mediated participation in urban space that engage bodily and architectural relationships with data rich environments. While briefly outlining each component – data and information visualization and collective engagement in public space – we will reflect on some of our recent work that aims to combine these components in order to test and develop techniques and theories of public data visualization. In particular we will focus on *E-TOWER* (2010), a visualization of Toronto's "energy" on the city's tallest structure, the CN Tower. [1] We will also reflect on a forthcoming large-scale interactive projection at the Archives of Ontario in Toronto that will enable participants to navigate through a digital image archive projected on the side of this building via voice recognition. Some examples from artists that have employed similar techniques such as Alfredo Jaar and Krzysztof Wodiczko will also be discussed as they relate to public data visualization. We contend that the combination of data visualization, public space, and digital display technologies represent an important aesthetic and technical challenge that engage new dimensions of presence for people, places, and things in a social and material environment characterized by networks and data.

A Fluid, Hybrid Space

The rhythms of the contemporary built environment at times feel slow in comparison to the frenetic oscillations of social practices mediated by information and digital infrastructures. The immaterial architectures, crowds, pathways and rest-stops of Facebook, YouTube, Second Life, and Tumblr, to name but a few, are frenetically populated and dramatized. But, of course, these sites are not limited to an engagement through desktop computers. Smart phones, networked screens, large digital public displays, and the many surfaces susceptible to a data projector's beam allow for a link between concurrent and contingent on and offline spaces.

Large media facades, reactive and relational architecture, geo-tagging, and networked location-aware mobile devices present us with a potentially productive confluence; a fluid, digital layer [2] that permeates the city. This mix of technology and urban space creates an increasingly conflated real and virtual

space, a new hybrid space. [3] The confluence of the networked, fragmented publics of the Internet and the publics formed in the squares, roads, and shared spaces of our cities, now adorned by media facades, sensors, and mobile devices, presents us with an expanded presence for cultural engagement and self-reflection. As Scott McQuire points out:

… media-dense spaces, comprising a variety of platforms such as large screens, LED signage, wireless networks, and a growing range of interactive capabilities ... are the inheritors of the tradition of public space constituted by street life, city squares, cafes, and public cultural institutions. They have assumed the task of catering for those who are present at a moment when being present has assumed new dimensions. [4]

The hybrid layer constituted by the built form, data, and communications networks represents a productive assemblage upon which identity, knowledge, narrative, and experience can be explored and constructed.

E-TOWER

It is upon these theoretical foundations that we began, in early 2010, to design what was to become *E-TOWER*. Our goal with the project was to create an interface that would link the participants of Nuit Blanche 2010 with one another through the city's tallest structure, the CN Tower. We aimed to engage participants at this all-night art party in a cooperative, collaborative project that would allow them to visualize their cooperation – what we termed "energy" – via phone and data networks and reactive architecture. The CN Tower, already equipped with LEDs and a Light System Manager (LSM) – and not to mention 500m in height – was an ideal canvas. On the night of Nuit Blanche, from sunset to sunrise, over 5,000 participants across the city texted the word "energy" along with the additional text that was displayed on an *E-TOWER* Twitter feed. The lights on the tower were programmed to respond to the quantity and frequency of participation by changing from "cold" to "hot" colours, growing faster and brighter as "energy stages" were achieved, culminating in a pre-programmed light show at the end of each full colour cycle.

Information Visualization

Between data and its expression, between the text messages sent for *E-TOWER* and the lights on the CN Tower, lies the crucial function of data visualization.

Data visualization, or information visualization, is one response to the interpretive and representational challenges related to information excess. Recent advances in computation and increasingly ubiquitous networked data-gathering and storing processes and devices have produced an incredible surge of information available to users (both specialized researchers and general consumers). This phenomenon has the dual effect of producing a potential increase of control over the flow of information of users, objects, and environments as well as a potential decrease in real knowledge due to a glut of information.

By compressing vast amounts of data into shapes moving in time and space in order to extract meaningful information, visualization promises to give users greater access to phenomena that normally escape human detection due to invisibility, distance or scale. With *E-TOWER*, we attempted to measure, interpret and display something otherwise invisible – the "energy" of the city during its annual all-night art

party. Of course, where we decided to display it – the mapping function that occurs through a visualization operation – was of particular importance. Donna Cox suggests that visualizations are particularly powerful in how they recontextualize data. [5] For instance, when demographic data is placed on a visual representation of the city, source domain is mapped onto a target domain. Meaning is thus borrowed from one in order to create new meaning. Examples of this include thermographic imaging as part of energy efficiency analyses, heads-up displays (HUDs) that place navigational controls and contextual information on windshields (and by extension onto the environment in front of the vehicle) or on views of first-person-shooter (FPS) games. Visualizations, in this sense, bring together heterogeneous objects onto a common plane or field of view contextually relevant to the data.

Contextually relevant visualization was central to *E-TOWER*. The CN Tower is a symbol of the city of Toronto, a marker of civic pride, and thus the "energy" that we were looking for was both called forth and displayed by the tower, augmenting the significance and presence of the tower and the citizens of Toronto. *E-TOWER* mapped quantitative data onto architectural space, and by nature of its visibility, mapped this on to geographical space. Both the mapping of information onto geographically relevant space and the shared experience of interacting with a visualization in that space represent an important combination of participatory and meaning-making potentials that form the focus of our research into public data visualization. *E-TOWER* explored a way of experiencing the city that combined light, data, and architecture, and attempted to visualize the emotions, connections, and data that flow between users, objects and their hybrid environments.

Dramatizing Architecture / Making Data Visible

Alfredo Jaar's *Lights in the City* (1999), presented as part of Mois De La Photo in Montreal, was an early and quite successful attempt at mixing data, light, architecture, and public space. Red lights were installed in the Cupola of the Marché Bonsecours, a landmark in old Montreal. Homeless shelters located within 500 yards of the Cupola were equipped with information about the installations. In each shelter, electronic buttons connected wirelessly to the red lights in the Cupola were installed. Every time a homeless person entered any one of the shelters they could push a button to engage the lights. The lights sent a sign to the city about the unacceptable condition of the homeless. At the same time, as the Cupola had suffered from fires in the past, the red light also represented the new and potentially more damaging threat to the city, that of its inability to care for all of its members. The data collected at the shelters and its representation on the cupola allowed for the experience of a presence with a human flow of people that have been historically marginalized and kept invisible. In terms of data visualization, here we have source domain and target domain combined: a demographic of the city was collected and displayed to the city by a symbol of the city.

Krzysztof Wodiczko's works also conjure presence through the use of media and architecture. His tactics often respond explicitly to the architecture and involve mapping the human body onto a building. Wodiczko's projections create a surrealistic collision between the image of a building or monument and the projected image. In this relationship, the built environment has figured as a central element of the final work as it brings forth its own social histories. For instance, Wodiczko's *The St. Louis Projection*(2004) in which prisoners and victims of crime share their stories, was originally intended to be projected on a large-scale on the face of the St. Louis Historical Old Courthouse – the site of a landmark lawsuit against slavery in 1846. Due to last-minute controversy concerning the content of the project it was moved to a nearby library building in order to avoid embarrassment. This signals the potential for the social histories of buildings to be re-presenced along with contemporary issues through visualizations and projections.

These examples serve to illustrate how presence can be explored through interactive symbolic representations and narrative forms. While Jaar's installation visually abstracted the movement of people in the city, Wodiczko's work literally places the bodies of people onto buildings. Both artists highlight, in very public ways, the stories and traces of people in the city and connect them back to place and the viewers located there.

Just as Jaar and Wodiczko seek to tell us about hidden aspects of historical events and present circumstances in public, Bruno Latour argues for an active and creative engagement with the flows and networks of people and things that are often concealed within objects including buildings and other environments. The goal for Latour is to make things public, to make spaces for critical reflection and engagement. [6]

We see public data visualization working toward the inclusion and interpretation of many flows and actors on the surface of a pubic structure. Associations between objects and humans as ongoing processes are represented such that the building upon which the visualization is projected assumes a kind of liveliness and complexity that juxtaposes the stable and concrete image of the structure with shifting and ephemeral flows of digital traces.

Archives of Ontario: Dramatizing the Archive

Following from these examples and our experience with *E-TOWER*, our next project,*Archives of Ontario: Dramatizing the Archive,* aims to create an interface with the searchable image database of the Archives of Ontario by projecting these images directly on to the building and allowing participants to access them through voice recognition. Pedestrians just outside of the building will be able to interact with the archive by speaking their search terms as they face the building. The unbroken interface afforded by voice recognition, the direct line of sight between the participant and structure, aims to address the discontinuities we found in the split interface of *E-TOWER* that required participants to interact first with their phones and then with the tower. Search terms will be captured and processed by voice recognition software that will allow participants to interact by speaking directly to the building. The results will be animated and projected on the side of the building. Search terms will be conjured by voice and emerge, when spoken, from behind a curtain, evoking the early practice of veiling sensitive photographs. Archive images will be pulled through the curtain by white-gloved hands. This refers to the procedural care that the staff at the archive take with each artifact that comes to the building. We hope that *Archives of Ontario: Dramatizing the Archive* will bring together archive, architecture, space, and audience in an expanded narrative and dialogue while animating, dramatizing, and connecting each in the process.

Public Data Visualization

It is our contention that art and design practice must take on the challenges of relating data, people, and space when being present includes living amidst ever-expanding digital archives and real-time data capturing capabilities. Our goal in considering data visualization and public space in the projects we have just described is to relate and make accessible a mixture of physical and virtual space, to create richer hybrid spaces that relate data, people, and things to one another in order to provide an opportunity for self-definition and self-understanding. *E-TOWER* attempted to do this by soliciting, visualizing, and mapping real-time data about the city's collective energy on a symbol of its collective energy. *Archives of Ontario: Dramatizing the Archive* will attempt to do this by moving the existing query and organization capabilities of the digital image archive to the surface of the building and creating an interface that will link

people, place, and data, dramatizing and extending each in the process. It is important for us that the associations between these entities are animated and related such that the building upon which the visualization is projected assumes a kind of liveliness and complexity that juxtaposes the stable and concrete image of the building with the data flows that increasingly define our always changing sense of personal and collective identity and architectural and spatial solidity.

Conclusion

Engaging people and public space through light, architecture, and data – mixing material and immaterial spatial regimes in order to explore the expanded presence afforded by the current interconnected state of media, communication, and public space – lies at the heart of our work in public data visualization. Although, as Liliana Bounegru reminds us, "technological mediated interaction in artistic environments … may be seen as producing an aestheticization of human relations and thus mask and weaken the meaningfulness of their direct experience by their spectacular representation by overwhelming the senses," [7] it can also afford, "opportunities for amplified consciousness of the self in relation to other beings in an intense sensorial, engaging way which goes beyond community and allows a more primary, more deep sense of human communion, a collective genesis afforded through technological mediation." [8]

References and Notes:

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5. *Donna Cox, "Metaphoric Mappings: The Art of Visualization," in Aesthetic Computing, ed. Paul A. Fishwick, 89-114 (Cambridge, MA: MIT Press, 2006).*
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7. *Liliana Bounegru, "Interactive Media Artworks for Public Space: The Potential of Art to Influence Consciousness and Behaviour in Relation to Public Spaces," in Urban Screens Reader, eds. Scott McQuire, Meredith Martin, and Sabine Niederer (Amsterdam: Institute of Network Cultures, 2009), 213.*
8. *Ibid., 213.*