reForming: Responding to Our Land in Crisis

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ABSTRACT

An environmental crisis in Australia in early 2009 prompted the architectural design work considered in this paper. Bushfires ravaged the Victorian hinterland, destroying lives and families. The crises inspired me to explore the ACADIA 2009 conference theme, reForm(): how technologies transform the ways in which buildings and spaces perform, act and operate. This paper explores architectural design in distressed contexts and some design technologies used to formalize new housing development and respond to the environmental crisis.

To begin, this paper will present precedent examples in art and in architecture that explore how software reforms the constructed world and, in turn, how our practices shape software. To provide a better understanding of these applications, this paper will also present the applied research of architectural design students in their final year at the University of Sydney. The student design work employed technologies similar to those of the precedent examples within the Australian site ravaged by bushfires to consider digitally aided design and social implications. This paper reinforces opportunities for designers and technologies.

1 INTRODUCTION

During February 2009, Australians awoke daily to new scenes of crisis and terror. Massive firestorms devastated large sections of the Victorian landscape, destroying homes and families. Feeling helpless and compassionate, many of us donated much-needed funds to support the rebuilding of the Victorian hinterland. The crises inspired me to explore the ACADIA 2009 conference theme, reForm(): how technologies transform the ways in which buildings and spaces perform, act, and operate. As an architect and academic, I am interested in understanding the role architecture can play in reForming a society, such as the affected Victorian community, and in how we as architects employ the technology available to us to transform and respond to our shifting environments and confront the social ramifications.

The Victorian crisis provided a platform for revisiting the debate concerning environmental shifts and the damage that is attributable to human activity. Overpopulation, political conflict, considerable levels of pollution, and depletion of natural resources are arguably hastening the destruction of environmental ecosystems and shifting climatic conditions (Gore 2006). While the building industry is a large contributor to environmental damage, architectural designs, both speculative and realized, can demonstrate predictive capabilities to address the environmental issues.

Architectural design practices considered in this paper include speculative imagery and mediation through performative technology in projects that acknowledge the responsibility of design, and the built environment, in tackling environmental shifts. The applied research of final-year architectural design students at the University of Sydney explores the precedent examples in art and in architecture. This paper reviews the comparisons to demonstrate opportunities for designers and technologies.

2 CRISIS

Each year in Australia, an ecological cycle of destruction and reformation features across news reports. Wet winters encourage dense bushland undergrowth, which dries in the warm summer months into a tinderbox. This tinderbox exposes the land, and the society living within it, to the threat of fire ignited by lightning strikes or arsonists. Frequently,

these fires cause minor damage to low-density wilderness and farmed hectares. Occasionally, the summation of many conflicting environmental conditions contributes to catastrophic firestorms, akin to those experienced this summer. Owing to below average rainfalls and hot strong winds, arson-lit fires razed hundreds of thousands of hectares of bushland, killing over 200 people across the state of Victoria (Volunteer Fire Brigades Victoria 2009). The scale of destruction to homes and families required significant community assistance through fundraising and other support systems. All prime-time television stations covered the extreme devastation (The Daily Telegraph 2009, Herald Sun 2009).

The crisis moved me, as an architectural designer, to investigate reformation options in sites prone to extreme environments, and to instigate a dialogue regarding our role as architects within the responding design community: what are the architectural opportunities within contemporary digital software for transforming the ways in which the architectural discipline can address change and devastation? The first avenue I investigated was the role of imagery in speculating architectural futures.

3 SPECULATIVE IMAGERY AND THE ARTWORK OF GIACOMO COSTA

I In a recent journal article, Greg Lynn suggested that "architects still pursuing the idea of generating buildings, rather than designing them, are merely seeking a spurious mystification of the art of architecture" (Lynn in Lally and Young 2007:66). This comment underscores the fear that exists within contemporary design dialogue that architectural design will fall victim to focusing too heavily on surface appearance and mimetic imagery resulting in overly simplified and rationalized architectural content (Benton 2008;101–102). Overt emphasis on form and the visuality of contemporary architectural production catalyzes fears that architectural design will be thought of as simply being pretty pictures, sacrificing a cohesive design (Gusheh 2004:46; Bilak 1998; Baker 1998:79). By implication, this fear of dwelling on the output of digital media in architectural design, in particular, its imagery, is alien to the values of selflessness and social responsibilities of architectural design practice. Moreover, dwelling on the output can result in minimal critical engagement and, thereby, lead to trivial and superficial architectural propositions (Allen 2000:xv).

However, an architect needs to understand that there is considerable communicative power within an image. The power is inherent in the understanding that the image is never a neutral tool or a mere mimetic picture of a building (Perez-Gomez 1997:7). Since the inception of Western architecture, the architect has not "made" the buildings but rather has made the mediating artifacts that communicate the buildings (Perez-Gomez 1997:7). In contemporary design and our image-led culture, the visual is a dominating aspect, and digital technology has largely driven it. The image has acquired a pragmatic role that has meant, for the most part, that computer graphic applications in architectural design are still little more than an efficient "mechanism of composition" due particularly to "seductive manipulations of viewpoints and delusions of three-dimensionality" (Perez-Gomez 1997:377). And while they make the "objectification of 'another' reality appear more intense," their use has arguably "not improved the quality of our environment" (Perez-Gomez 1997:377).

As a tool of representation, digitally mediated imagery can be harbored for a "theoretical potential for heading toward either absolute fluidity or further fixation and reduction" (Perez-Gomez 1997:378). This notion follows a tradition of practice begun by architectural artists such as Piranesi, Legeay, Boullee, and Ledoux (Perez-Gomez 1997:378), and continued more recently by Lebbeuz Woods, whose buildings "only exist on paper [with a] mastery of gesture and reality in drawing, making the viewer believe that the unlikely is likely" (Cook in Bingham 2004:25). With digital techniques, as Cook suggests, this tradition may continue the "ability to explore different, surprising dimensionalities, in a fluid medium where collage and monstrosity are almost natural, could hold great promise for architectural practice" (Cook in Bingham 2004:25). As Cook notes, "engaging time in visual experience, the ephemeral architecture, constructed in cyberspace, could conceivably function as a site for imagery and reverie" (Cook in Bingham 2004:25).

Following the views of Walter Benjamin, the digitally mediated image presents a platform to "fantasize" and to "explore" (Benjamin 1992:218). Giacomo Costa, a Florentine photographer, uses imagery to demonstrate the power of speculation. He fuses photography and digital techniques to create fantastical futuristic cityscape imagery. Amorphous megastructures, which are free of both occupation and upkeep, punctuate deteriorating monotonous cityscapes (fig. 1).

Costa lets his works speak for themselves. He respectfully allows the viewers to form their own interpretations of the works. Within the publication, Giacomo Costa: The Chronicles of Time, the editor clarifies that Costa employs "Hollywood blockbuster style digital techniques [to] reshape our collective idea of the metropolis through fantastic cityscapes straight out of science fiction" (Costa 2009). The work merges natural or human-induced catastrophe through intricately detailed imagery, recalling both the fictional work, "the world without us," a speculative nonfiction that considers what our planet would be like without human presence (Weisman 2007), and "classical Florentine architect Antonio di Pietro Averlino's ideal city, Sforzinda" (Costa 2009).

As Costa's imagery suggests, designers need to progress from the view of the digitally mediated image as a superficial or merely pragmatic tool in architectural designing and reinstate its role in communicating speculative futures. The designer needs to continue to consider how imagery is orchestrated as an illustration, in any medium, in ways that allow the imagination to roam and that show the viewer the unexpected (Bingham 2004:12).

Figure 1 Giacomo Costa ATT0 N.3 2006, ATT0 N.10 2007, PERSISTENZA N.2 2008 (Cropped images, full plates in Costa 2009).

4 PERFORMANCE TECHNOLOGY AND THE ARCHITECTURAL DESIGN OF GREG LYNN

To arrive at speculative imagery, a designer considers external and internal factors (Cuff 1991:72–84), such as ideology, chosen media, and site variables. In observing the final speculative imagery, a viewer is often unaware of the unspoken logic: the dialogue shared between the designer, the influencing factors, and the organizing principles arranged in software technologies. Digital performative technologies may assist how designers derive and control logic.

Greg Lynn describes this approach as a "performance envelope" (Lynn 1999:13), which exploits environmental influences in order to reform architecture and its possible futures. The performance envelope identifies "expressions," which are "statements that define the size, position, rotation, direction or speed of an object" (Lynn 1999:14), and statements regarding relationships, which inform how an object may gain characteristics from adjacent objects or forces, namely "multiple independent interacting variables [that] can be linked to influence one another through logical expressions" (Lynn 1999:14). The result is a framework from which a series of possibilities or "instances" may be derived (Lynn 1999:14).

Lynn uses this design approach as a way of highlighting the challenge facing contemporary architecture: to "understand the appearance of these tools in a more sophisticated way than as simply a new set of shapes" (Lynn 1999:14). Lynn suggests that designers need to consider how to engage issues of time and motion in design, and the conceptual and organizational facilities within computation alongside issues of aesthetics and materiality (Lynn 1999:19).

Figure 2 Greg Lynn SIM Residence (Lally 2007)

Figure 3 Greg Lynn SIM Residence Exploring Design through Performance Technology (Lally 2007)
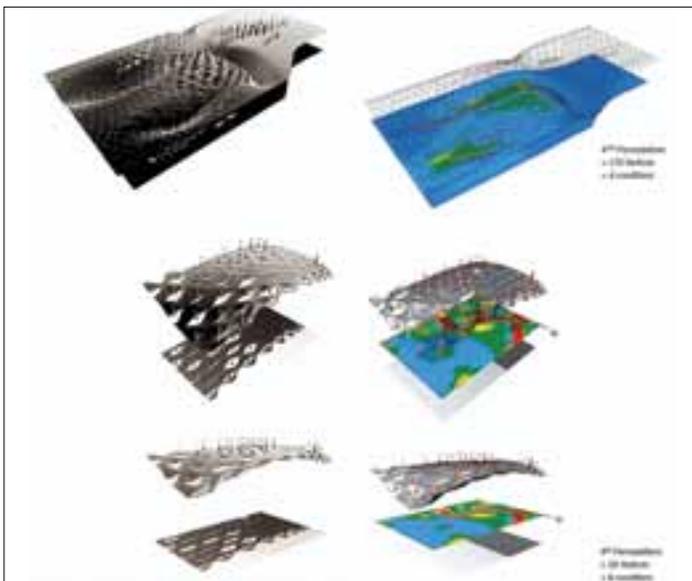
Lynn's SIM Residence demonstrates the concept of the "performative envelope," as Lally calls it (fig. 2). While the final proposition is rigid in form, its underlying logic is dynamic and responsive to occupation and the landscape surrounding it. The building is "imbued with performative variation derived from multiple scenarios of living…as a method to develop configurations that, while dormant, exist simultaneously within the form until activated" (Lally 2007:27). The form, space, and territories of the SIM Residence parametrically adjust and are analyzed with performance technology. The design is, conceptually, a built ecology between form, air, and temperature performance derived through digital techniques (Lally 2007:27).

Considering Lynn's project reinforces the notion that performative digital design technologies can contribute to the understanding of environmental influences on a form. Through these dynamic technologies, designers can explore representations of forces to inform their design's geometry and surface. Simulation aids this exploration, which can take into consideration broader ecosystems and interconnected variables (Lally 2007:25).

5 APPLIED RESEARCH: SPECULATION AND MEDIATION EXPLORED AT THE UNIVERSITY OF SYDNEY

Taking lead from the project examples, and from other university education programs such as the Architectural Association's Extreme Environment studio and Environmental Tectonics studio (Hardy 2008), masters students at the University of Sydney used the aforementioned techniques, reconsideration of imagery in speculating architectural futures, and the exploitation of performative technologies in informing the underlying logics of design as a framework for applied design research. The Victorian crisis was given as the context, and the students were asked to design new lodgings for the fire-affected area.

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Students identified key conceptual influences impacting their design and employed parametric models and scripts to create formal responses. The designs progressed by considering the context of site and reconsidering the techniques employed. Through their iterative reassessment of concept, technique, context, and performative quality, architectural propositions emerged and were refined. Following are three student projects; reviewed in terms of parametric frameworks, imagery, and their contribution toward the dialogue regarding the crises context.

5.1 SPECIFIC PARAMETRIC FRAMEWORKS

The first project used a control spline and a number of points of change to establish an overarching gestural layout across the site. Along this spline, the students configured a series of lengths and widths to determine unit types and positions.

The second project used a grasshopper script to organize a deformable triangular form along a defining spline. The arrangement was then tested and applied across several terrain typologies. The students then developed one selected typology to a higher architectural resolution.
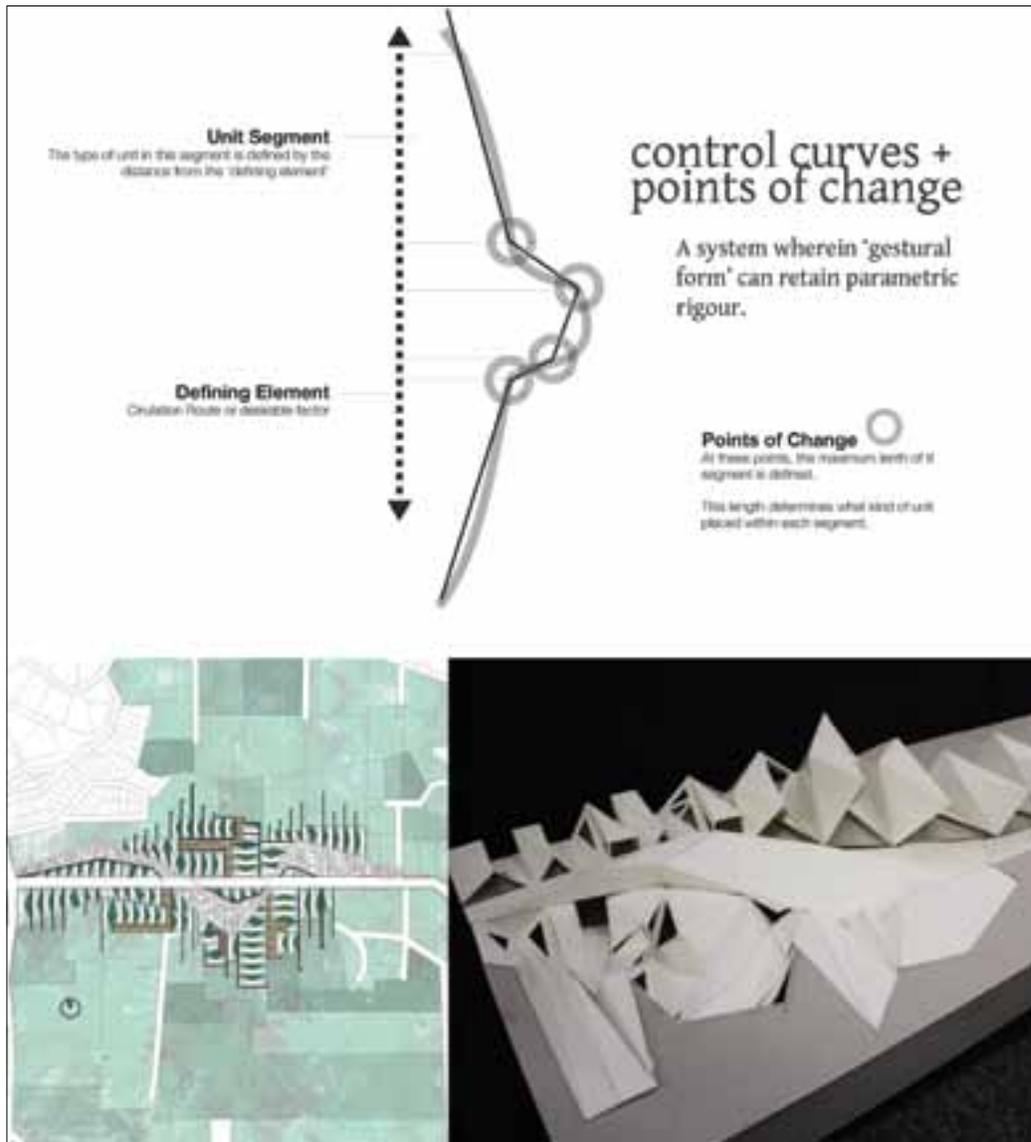

Figure 4 Design Studies Completed by Andrew Daly, University of Sydney, Master of Architecture Student, 2009

The third project defined three differing spatial areas for a mixed-use development: housing, work, and play. The students then filtered these spaces through the remaining trees and Victorian site ruins and elevated them by an amorphous nurbs surface stretched across the spaces. To refine this surface, the students identified key control lines and cross sections, which they then used to develop the details of the building, including a water sprinkling system as a first line of defense.

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These students also developed a series of images of their design that visually expressed their project within the ruined site of Victoria. Their proposed building was designed to be destroyed in the reoccurring firestorms. While the students articulated the parametric logics in accompanying panels, the moody montages intertwined the new building form with the decimated context of the fire-affected area, resulting in a series of images that conveyed a haunting speculation.

Figure 5 Design Studies Completed by Ian Gibson and Amelia Parkins, University of Sydney, Master of Architecture Students, 2009
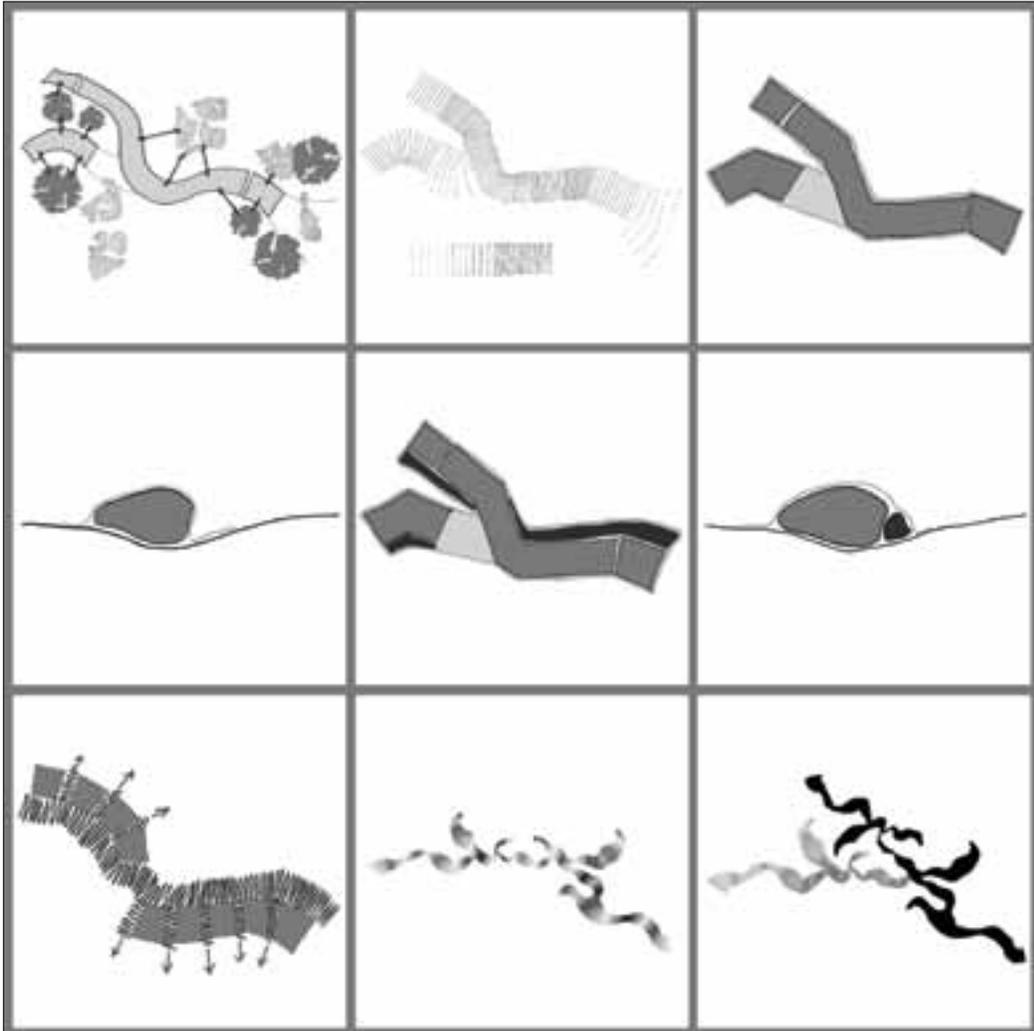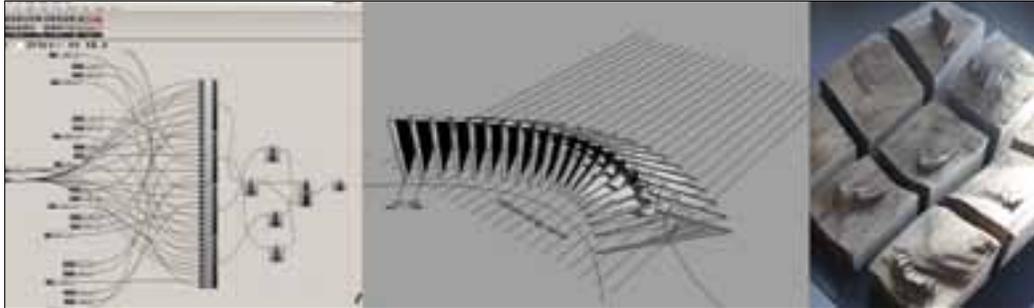

Figure 6 Design Studies Completed by David Bonouvrie and Katherine Harrison, University of Sydney, Master of Architecture Students, 2009

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5.2 PROJECT SUMMATION

While each project evolved differently, directed largely by the initial conceptual framework developed by the individual students, the clarification of set out control points, organization, and relationships of the design formally assisted each project. Explicating these design items into simplified diagrammatic schemas (similar to fig. 6) provided a basis for the review panel to evaluate and understand the formal geometries. Further explication of these forms, to their adjacent contexts, evolved by way of the students making physical models and sketches. In reviewing the students' work, it was apparent that only a formal level of information was informing the digital parametric models, and the design schemas themselves. The review panel suggested additional time, a refined brief, and a clearer set of design drivers; for example, environmental, structural, and programmatic should be clarified in future studio briefs to enable a more developed model. While I would have liked to see the student work extend beyond the projects of Lynn or Costa, I discovered that the students found no significant variations to these established modes of operation. This was likely due to the limited skill set of the students and the conflicting technological and poetic aims of my studio framework. The studio work as a whole resulted in a battle between poetic gestures and rigorous dimensional constraints (similar to fig. 5).

However, the exercise did address our need to introduce the students to parametric techniques, and the students developed a number of design applications for this technology in the studio. Through the exercise, I became aware that developing parametric models could contribute to geometric manipulation, but if the skill base of the designer is low, there can be a tendency to disregard other influences on the design, which could also feed into the parametric model, for example, environmental conditions such as sun movement. The more successful projects saw students working together, or combatively, to ensure that the pragmatics and the technique balanced with the poetics and the social agenda.

As with Costa's imagery, the gestural, poetic, and conceptual visualizations aided the students in conveying poetic architectural narratives. Their speculative imagery attempted to portray reformations for the society. Within these representations, the computational techniques were relegated to unspoken logic or a dialogue shared between the designer and the material (be that digital or analogue) in the process of developing the design. In the final visual work, issues of composition, organization, and relationship were curated and conveyed through digital imagery and used to reinforce powerful visual messages regarding the architectural design, the environmental context, and humankind (similar to fig. 7). In this sense, the studio was productive in verifying the importance of articulating an architectural "narrative" in the early stages of design, and this outcome suggests an area for further research.

In terms of the context, the crisis provided a challenging and engaging framework. It provided stimulus for the exploration of the digital techniques and introduced students to disaster-orientated design. The exercise offered a more "real" practice problem and led to the development of a series of proposals for the Victorian hinterland in terms of how we may be able to begin reforming that part of our world. The context further provided a stimulating learning experience for the students, and while we may not have addressed all of the influences, or any of these in great depth in this single project, as Hardy suggests, we still need to design for the conditions of the near future (Hardy 2008:17). If nothing else, this project served as a reminder that our environment is informed by and can inform the digital design processes that we may employ as architectural designers. While techniques can be fascinating parts of daily practice, larger contextual issues can arise to shock architectural designers into also engaging in the reality of social crisis. If the projected shifting environmental ecosystems and climatic conditions (Gore 2006) unravel, the capacity to address these concerns in a dynamic manner could become more necessary. This, again, suggests an area for further studio examination.

CONCLUSIONS

Within the context of the 2009 Victorian bushfire environmental and social crisis, I was inspired to contemplate the architectural opportunities within contemporary digital software for transforming the ways in which the architectural discipline can address change and devastation. The investigation identified possibilities in imagery and performative technologies in speculating and developing architectural reFormation.

The role of imagery in signifying projective futures and presenting speculations to inspire society was discussed. The history of visionary architectural imagery is long, and through the integration of digital techniques, imagery allowing

the imagination to roam and showing the viewer the unexpected may be an area for development. Advancing digital simulation and visualization technologies offer a platform to develop fantastic visions, as demonstrated through the artwork of Giacomo Costa. While this is a static end-product example, movement and transformation techniques can further extend how designers re-vision new tomorrows. As demonstrated in Greg Lynn's design, dynamic performative or parametric media can be employed to not only re-vision form, but also to develop and control how a designer re-shapes form to respond to environmental issues.

Applied research at The University of Sydney explored performative digital media and imagery. The university-based project work provided a few insights into applying the techniques into design. While we may not have made significant advancements to the application of the tools in the design, we were able to demonstrate to students their potential in informing their designs and how a stimulating contextual problem can provide an inspiring learning experience.

While meteorologists, politicians, and citizens have seemingly limited control over the unpredictability of shifting and extreme environmental conditions, architects do have the potential to employ and control technologies operatively in the 'definition and qualification of the territories we construct and inhabit' (Lally 2007:32). Although the natural world we live in is somewhat uncontrollable and ever-changing, the projects presented in this paper discuss a number of ways in which an architect can begin to contribute productively to reformation. These include speculative imagery and performative technologies.

ACKNOWLEDGMENTS

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