Live Models

Jason Kelly Johnson and Nataly Gattegno, Future Cities Lab

[1.09.2012]

Live Models are dynamic formations that register and continuously adapt to shifting atmospheric and microclimatic conditions. These models can be used as analytical engines to understand the patterns around us, and in some cases, as conceptual frameworks for architecture. The most compelling of these models do not merely depict the appearance of things, but seek to reveal the irreducible nature and behavior of processes in transition. Not only are they capable of calculating the underlying logic of these processes, they also reveal emerging organizations of energy, form and flow in visually discernible patterns.

Our design practice routinely employs what we call live models and a promiscuous mixture of design tactics from the fields of interactive design, robotics, biology, material sciences and advanced fabrication. Closer to a research laboratory, our practice operates as a loose collaborative bringing experts and practitioners into the studio environment mixing disciplines and tactics. Alternative modes of exploration, representation and design emerge from this crosspollination, yielding a conflation of dynamic representation, modeling and simulation which has deeply affected our approach to design. How does the cross-knitting of modes of representation and simulation – including physical modeling and dynamic cartography – suggest a productive framework for design practice? What is at stake when a model attempts to exceed the world of pure simulation, and demands some form of analogical reasoning and perceptual analysis? What is at stake when a map or a model not only demands interaction, but relies on the participation of viewers or its environment for the activation of meaning? At which point does the model exceed its representation?

Models are intriguing in their ability to analogically represent the nature of things and to simultaneously reveal conditions previously invisible. This perceptual oscillation between the analogical and ontological reading of models is of particular interest to us as it allows for the indexing and transformation of actual energies at play. Historian of science D.Graham Burnett suggests that "*what makes models so powerful is precisely the slipperiness of this distinction. The move from 'as' to 'is' can happen fast, can happen for only a moment, can subsequently be denied – it is in this instability, this indeterminacy, that models ultimately do their real work.*[i]*"* Live models thrive in this instability; they rely on their grounding in existing forces and live energies, while flourishing in their unpredictable and blurred interpretations.

Interestingly, the word 'model' is an auto-antonym, containing two antithetical definitions. It simultaneously defines a fake and an ideal; it describes the representation of a given condition and an exemplar, prototypical order. This representational fluctuation is core to live models in the way they operate, to simultaneously represent existing and ideal conditions. Live models are triggered by existing forces and energies. They represent those energies and strive to articulate their unpredictable and surprising consequences.

Historically, orreries and astronomical clocks are clear examples of this perceptual fluctuation of models. They consist of gears and rotating orbs that not only mechanically simulate the interaction of planets in the solar system, but also model spatial relationships including the relative position, volume, scale and trajectory of planets and satellites. They operate as dynamic models and allow users to see, experience and juxtapose information from differing perspectives. Astronomical clocks powered by gravity allow the slippage between the represented (the simulated) and the ideal to go even further. The forces applied to the model are real, live forces and energies surrounding both the simulated and the idealized representations. In other words, the model is dynamic, kinetic and live; its sole limitation lies in the mechanics of its gears.

Contemporary examples such as Sachiko Kodama and Minako Takeno's *Protrude, Flow*[ii] use a material's properties as a mechanism to slip between analogical and ontological representations. Ferro-fluid is a liquid which becomes strongly magnetized and transformed in the presence of a magnetic field. *Protrude, Flow* indexes the sonic energy surrounding the installation through a series of magnets that control the magnetic fluid and reconfigure it relative to the sound levels present. The ferro-fluid does away with mechanics and relies on a phenomenon - magnetism - to propel the representation of energy exchange. *Protrude, Flow* behaves as a model, a live model - or system – that slips between the representational interpretation of a phenomenon and the exposure of latent potentials within the system.

As a result of the blurred and highly interconnected environment generated by live models, new dynamic cartographies emerge that are latent with real-time, open-source, user-generated data[iii]. With the advent of immersive technologies, these models are rapidly becoming experiential worlds unto themselves, dynamic cartographic manifestations of energies and flows, parameters in flux and in constant transformation relative to their microclimates. These representations blur distinctions between models as mere depictions, and models as vital sensorial spaces that are live and impregnated with mutable data. Live models absorb information from their surrounding environment [temperature, weather, pollution, circulation] and through a reformulation of live inputs yield formal logics and live outputs that are simultaneously representational frameworks and spatial armatures for design. As a design practice, we are interested in this latency and believe there is a fundamental shift taking place in how we expect models to perform as analytical machines, and how in turn those machines become dynamic, and perhaps intelligent, frameworks for architecture and design. These frameworks set the boundaries and outer limits of performance and ultimately describe the inextricable relationship and design interdependence between energy and form.

THE AURORA PROJECT

The *Aurora Project*[iv] was instigated as a way to explore the questions articulated above and experiment with the perceptual oscillation of live models. By enabling us to work with a constantly fluctuating set of inputs, the Arctic became a site for experimentation with a constantly transient and dynamic dataset. The fluctuation in the dataset did not only exist in the pure phase change of water to ice, but also in the dramatic effects of climate change on the Arctic region and the simple fact that new ground is constructed – or more aptly emerges – seasonally and annually. The Aurora Project was initiated as a

series of three distinct design explorations that emerged out of an extensive study of how the Arctic region has been represented, and in many cases, misrepresented throughout time. The intention was to use these representations as points of departure for engaging contemporary political, social and ecological issues. The Aurora Project was comprised of three components: *Terra Incognita*, the *Aurora Model* and the *Glaciarium*.

Terra Incognita consisted of maps and diagrams that provided a view into how the Arctic region has been represented, claimed and mythologized in the past and present. This graphic experiment concerned itself primarily with the dilemmas of representing something – ice – that is in constant fluctuation. Through the study of historical maps and abundant contemporary real-time data from the Arctic, *Terra Incognita* experimented with ways to synthesize, remap and remodel these representations that consciously oscillated between modes of dynamic modeling, cartography and creative fiction.

The main interactive piece – the *Aurora Model* - superimposed the ephemeral qualities of these representations with the dynamic behavior of multiple users, translating the shifting dimensions of the ice into a responsive light field. The model was constructed using a series of horizontal layers that indexed both static and dynamic relationships occurring in the Arctic: bathymetry, temperature, salinity and ice thickness defined the organization of the surface. The responsive qualities of the *Aurora Model* described the way natural and artificial systems interact and adapt to one another. Left unattended, the surface of the *Aurora Model* would be brightly lit through a series of LEDs populating the interior of the surface. Approaching the model as a spectator would trigger a reverse reaction: the LEDs dimmed away from the viewer and a series of 'auroras' – blue cold cathode tubes – lit the middle of the surface.

The *Glaciarium* was a smaller interactive instrument that engaged a smaller group of users' senses through the sight and sound of a melting ice core. The influence of the individual viewer was linked directly to the materiality and sensation of the project. Increased observation amplified the internal lighting effects and, depending on the duration of interaction, dramatically accelerated the melting of the ice core rendering the environmental degradation visceral and real.

CONCLUSION

The *Aurora Project* experiments with the perceptual fluctuation between vast scales of both geography and time, and reveals the potential for models - and perhaps by extension, architecture - to simultaneously index, synthesize and engage climatic, cultural, social and politically charged fields. Live models describe a promiscuous, polluted and dirty design process with unexpected design outcomes. The oscillation, in what we call *live models,* between metaphorical and ontological data is integral in their ability to become design tools – tools that represent existing, but also refer to latent potentials. Olafur Eliasson claims that what we "*are witnessing is a shift in the traditional relationship between reality and representation. We no longer progress from models to reality, but from model to model while acknowledging both models are, in fact, real... Models have become co-producers of reality*."[v]

Models are beyond real – they are active, evolving and live.

[i] D. Graham Burnett, Masters of the Universe, in *Models: 306090 Books*, Volume 11, edited by Emily Abruzzo, Eric Ellingsen and Jonathan D. Solomon, New York: 306090, Inc., 2007, p.44.
[ii] TROIKA: Conny Freyer + Sebastien Noel, Eva Rucki, *Digital by Design: Crafting Technology for Products and Environments*, Thames & Hudson, 2008, p.122.
[iii] Some examples include real time climate data from Pachube (www.pachube.com); texture-mapped, multi-layered three-dimensional models from Google Earth (www.earth.google.com); real-time data flow between the digital and physical worlds from Firefly (www.fireflyexperiments.com).
[iv] For full credits of the Aurora Project, please visit www.future-cities-lab.net; photography: Zechariah Vincent.
[v] Olafur Eliasson, Models are Real, in *Models: 306090 Books*, Volume 11, edited by Emily Abruzzo, Eric Ellingsen and Jonathan D. Solomon, New York: 306090, Inc., 2007, p.19.

Additional Credits: A version of this essay was previously published in VIA:Dirt, 2012 by MIT Press (Edited by Megan Born, Helene Furján and Lily Jencks.)