LEA
Leonardo Electronic Almanac
Vol **16** Issue **6 – 7**

CREATIVE DATA: VISUALISATION, AUGMENTATION, TELEPRESENCE AND IMMERSION

Guest Editors: Jack Ox, Jeremy Hight, and Erik Champion

For this special issue of Leonardo Electronic Almanac, we invited papers and artworks that deal with the emerging practice of data visualization as an immersive experience. Data has long been the property and domain of screen-based collection, archiving, processing and interaction. The emergence of new processes, functionality and ways of interacting with information is opening up several new areas of great possibility in which the data allows newfound thematic and engaging forms of immersion, as well as innovative and perception-reshaping interaction.

Consider a simple analogy; to swim in a pool is to understand three-dimensionality, interaction, spatial relationships and a macro-micro view, as well as contextual and embodied interaction. Can we swim with data? How do we build, debate and discuss the future and shape of immersivity in its relation to data? Can the representation of data as an immersive environment be considered a creative accomplishment or support creativity in action or as spectacle? How does this change the way we collect and archive information? How does it relate to our ways of interacting with information in study and analysis? How can this enhance or fuse key aspects of image projection, virtual reality, augmented reality, new media and even locative media?

We looked for essays, interviews, reports and other forms of writing that look at spatialization and layering of information, a greater sense of immersion, new forms of visualization and depth of field, precedents, future applications and connotations, our relationship to immersion and information inherently as how this applies to this new area.

Cindy Keefer's essay explores creative data visualizations in very early immersive and dome environments, beginning with Oskar Fischinger's 1920s "rooms of light and musik." Although Oliver Grau [1] makes the point that immersive environments began as far back as Pompeian wall murals, Fischinger was a pioneer in electronic immersion. In the late 1950s, Belson's perception-altering Vortex Concerts manipulated spatial concepts, both visual and auditory. Both artists were concerned with manipulating tradition cinema boundaries to create illusions of "endless space."

What is the data which is being moved and looked at and through with these artists from the early 20th Century? Keefer describes Alexander László's Farblichtmusik, a complicated instrument that played a color organ piano and multiple projectors that he played with Fischinger's 35 mm abstract films and painted slides. The data, or the vocabulary, is created with colored light and handpainted markings on glass, while the patterns of activity and relationship between objects comprise the syntax of the data. This pattern formation comes from the domain of music, and is in fact Visual Music.

Joe Faith is concerned with different systems for viewing data, He outlines three different systems of data exploration: all using three visual elements, square points that are colored, and lines. He describes multi-dimensional scaling (MDS), a linear projections system that can be seen through two dimensional windows, Principal Components Analysis (PCA), a projection-based dimension-reduction technique, and he follows with his Targeted Projection Pursuit (TPP) as a method where one can move the actual data in order to detect patterns not visible in all views. This is a point we can see how valuable it could be for scientists to actively work with artists in developing rich vocabularies and spatial organization of elements. Viewing scientific data with a richer vocabulary in an immersive environment could be a leap forward in detecting patterns.

Trish Adams in "Machina Carnis" recontextualizes key elements of scientific visualization, videomicrography and analysis and work with stem cells. She herself describes it succinctly in her essay as a "sensual reading of the scientific experience." Her work takes visualization and data analysis and places it in the lens of both formalistic and semiotic re-readings and into a fascinating kind of self reflection and narrativization.

Carol Lafayette in "Atta, Palindrome" uses ground penetrating radar (GPR) to move beyond previous physical modeling of ant colonies and to do so in a way that leaves the colony undisturbed. The essay maps how she took a tool used to map buried Archaeological ruins,earthquake faults and lost pipes to instead both create an interactive 3D model and a "cinematic voyage through the tunnels." The project and immersive visualization allow a new filmic and data rich way to view the details and architecture of the Atta Texana ant colony.

Ruth West and her team in Atlas Silico take the mass data set of the Global Ocean Survey and using 3D virtual reality to create a "physically interactive virtual reality installation." The essay discusses how the database is made visceral and how data set and its corresponding interactive visualization can move from genetic data of things as small as micro organisms all the way out to the corresponding environments both physical and social of

their geographic location. The data becomes an immsersive and interactive environment in itself as a visualization while simultaneously re-contextualizing the interface with large data sets.

Inspired by both the Memex and the Memory Palaces of Simonides, Steven Johnson once argued that the most engaging three-dimensional environment would be socially associative, interactive, and task-oriented with a 'recall' or a 'trail' of the users [2].

In "Satellite Stories: Immersion In The Large Scale Projection Of Google Earth And Public Storytelling," Joanna Griffin describes how immersing the public in a large scale display of the desktop phenomenon that is Google Earth, allows individuals to recollect and recount their own personal memories of their home and neighbourhood from a new vantage point. Rather than the expensive and relatively inaccessible virtual reality technology of research labs, projects such as Satelite Stories recombine the personal, the social and the tangible.

Closer to earth and yet unsettling, Luther Thie's project "LA Interchange" explores the aesthetic and ethical implications of conveying traffic accidents as public visualization. Why must public visualization projects create pleasurable feelings? Transmitting individual accidents as they happen, but displayed as comforting colours is an uncanny juxtapositioning of streaming data and individual tragedy.

In LifeClipper, Wasserman, Torpus and Buhlmann investigate the potential of design and content of media performances in public spaces, to see and hear virtual elements subtly woven into the real surroundings. Visualizations of Archaeological knowledge ("Archaeology"), projects of urban planning ("Archiviz"), and experiments with perception ("Playground") are discussed as a means to fuse design, research, art, immersive visualization tools and elements of locative media to push forward in immersive multi modal visualization.

Editors Bios

Erik Champion is an Associate Professor and Director of Research and Postgraduate Studies at the Auckland School of Design, Massey University. His most recent supervising and research involved Mac OS-based game design, intermedia/hybrid tactile panorama tables, biofeedback for immersive gameplay, evaluation critique of Virtual Heritage, thematic interfaces, history-based game environments, and warping for projection onto 3D surfaces. He is a Fulbright scholar, and has won Swedish Institute, Apple WWDC and Australian Research Council scholarships, national and institutional grants, best paper awards, and has been invited to speak in Australia, the United States, Spain, Korea, Singapore and Taiwan. A member of ICOMOS ICIP, he is also on the editorial boards of *Journal of Virtual Reality and Broadcasting*, *Games & Culture: A Journal of Interactive Media, Gaming and Virtual Worlds, International Journal of Gaming and Computer-Mediated Simulations (Book Review Co-editor),* and *Loading*. He has or is editing or co-editing special issues of *Techné, International Journal of Heritage Studies,* and *the International Journal of Architectural Computing*.

Jeremy Hight's work in locative media, new media , text and image and sound art has been shown in galleries and museums internationally. He created locative narrative in the 2001 project "34 north 118 west." He is also an information designer and theorist working in augmented reality, immersive visualization, locative media and interface design. His most recent work is in developing a kind of geo-spatial internet combining locative media,gis,social networking software, ai and freeware. His
initial work on it was recently published in Parsons' Journal ofInformation Mapping. He is also is currently developing 2 new methods for measuring events in time using immersive visualization and ai and real time data streaming.

Jack Ox is an assistant research professor at the U. of New Mexico, where she is also faculty in the IFDM program (Interdisciplinary Film and Digital Media), a research associate in the ARTS Lab and associated faculty in the Center for Advanced Research Computing. She has been on LEONARDO's editorial board for over 20 years and was guest co-editor *Synesthesia and Intersense (*1999-2001*)* with Jacques Mandelbrojt. Ox has been working on the *Gridjam* since 2002 [http://www.jackox.net/pages/gridjamIndex.html], a real-time, geographically distributed, networked multimedia event, using speed of light international optical networks. Her previous work includes visualizations of Igor Stravinsky's *Symphony in Three Movements,* Gregorian Chant, and Debussy's *Nuages*, with the last pre-virtual reality work; an 800sq.' hand painted visualization of Kurt Schwitters' *Ursonate* [http://www.jackox.net/pages/Ursonate/ur_MAINindex.html].

References and Notes

1. Oliver Grau, *Virtual Art: From Illusion to Immersion*, (MIT Press 2004).

2. Steven Johnson. Interface Culture: How New Technology Transforms the Way We Create and Communicate, (San Francisco, U.S.A.: HarperEdge, 1997, pp. 120-122).