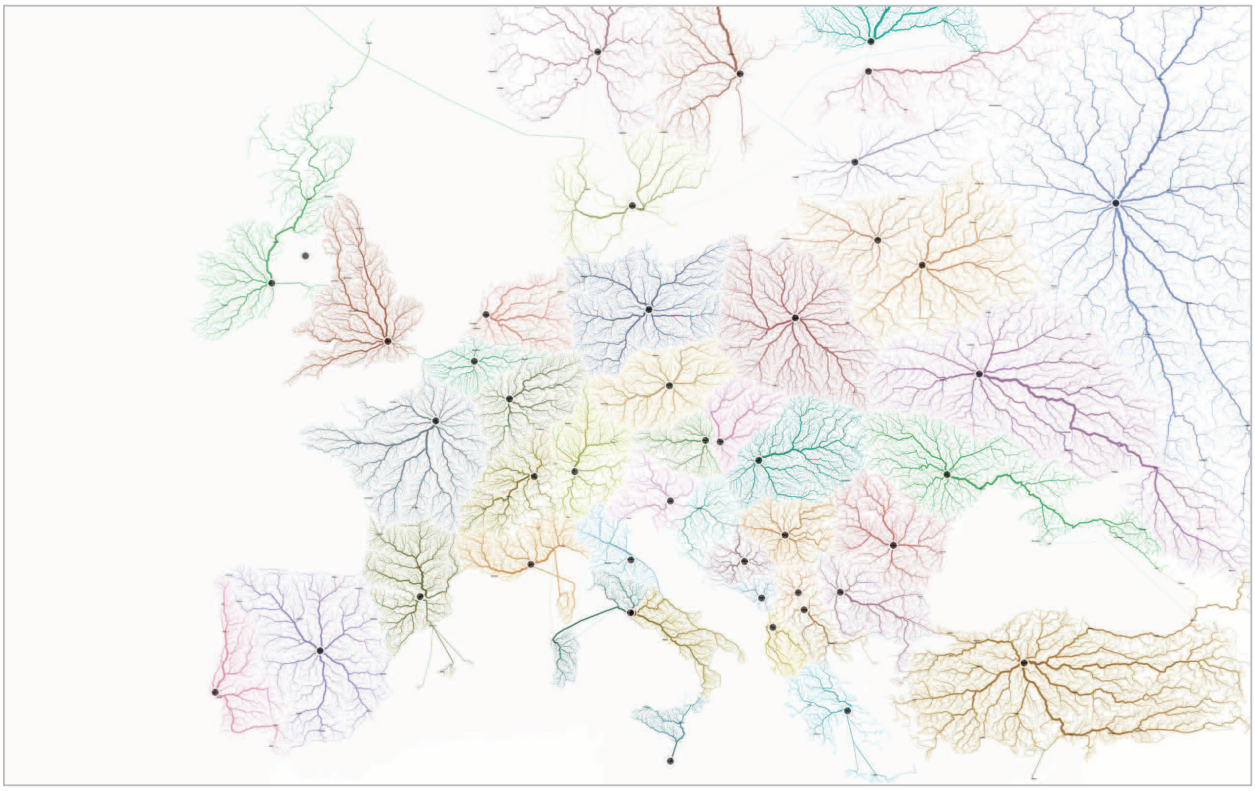


Roads to Rome visualization. (© Raphael Reimann // moovel group GmbH)

ROADS TO ROME (VISAP'16)

Benedikt Groß, Raphael Reimann and Philipp Schmitt

Web: https://lab.moovel.com

Where do you start when you want to know every road to Rome? Examining 486,713 starting points within Europe, *Roads to Rome* calculates a route for every possible trip. The "Urban Mobility Fingerprint" and "Street DNA" diagramming techniques present different methods of visualizing routes to a single location from a multitude of starting points. The more often a particular street segment is used in the routes, the more strongly it is indicated on the map, revealing interesting mobility patterns.

 https://doi.org/10.1162/leon_a_01837

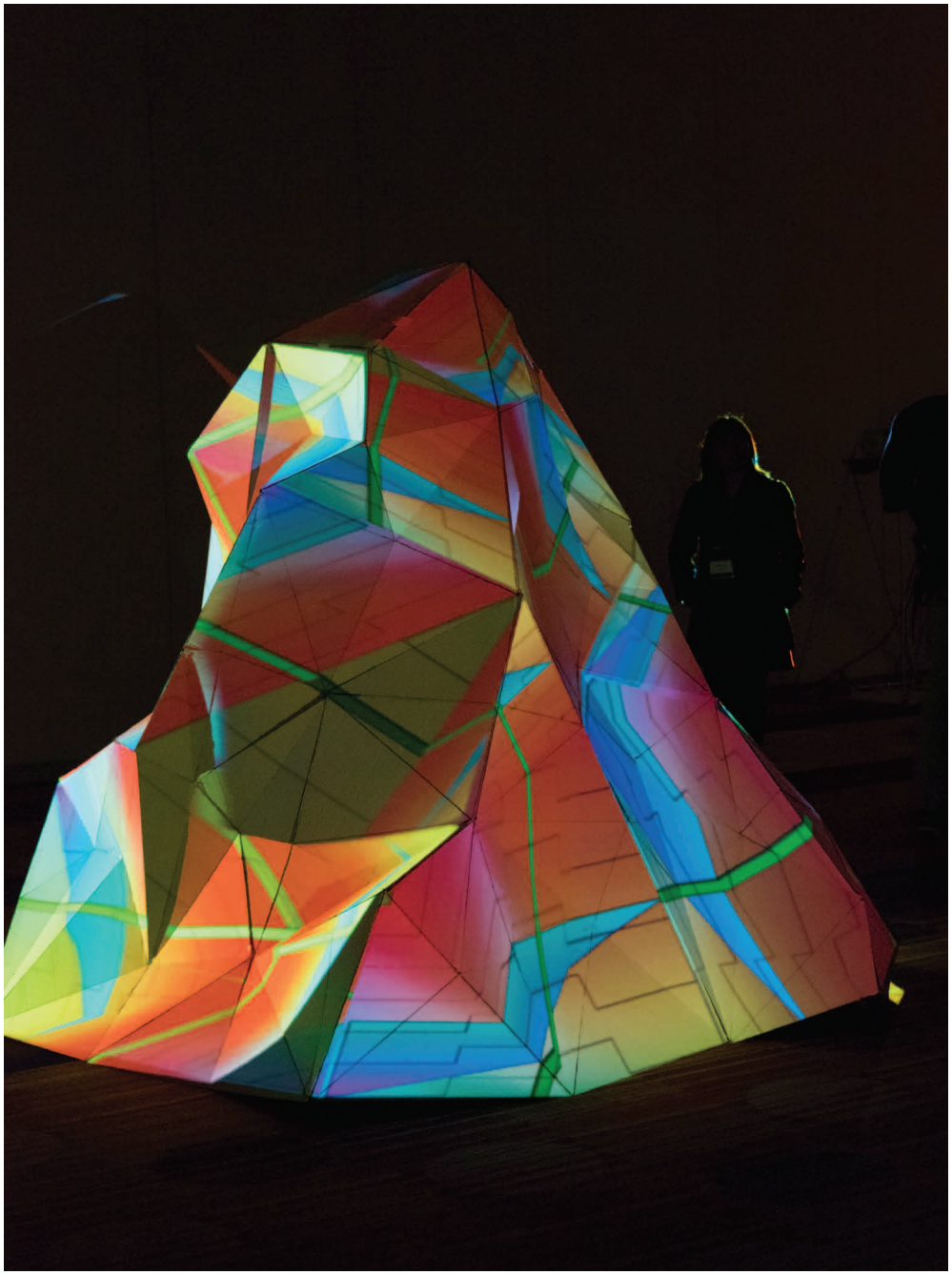
GEODE (VISAP'16)

Esteban Garcia Bravo, Maxwell Carlson, Aaron Zernack and Jorge Garcia

Web: www.carlsongarcia.com

Geode is a video-mapped sculpture developed from an analysis of improvisational geometry in three-dimensional space. The project interrogates the aesthetic potential of emotive geometry by utilizing nonorthogonal shapes and mathematical models based on points and infinite planes.

Geode takes neo-concrete art to a new dimension by integrating digital geometry in response to audio synthesis. In this way, we accomplish a crystal-like shape that glows like a mineral geode. The surface variations are the result of real-time sound synthesis. We visualize soundscapes by transforming analog signals into digital data in real time. The sculpture's metamorphosis is experienced visually by sound-driven generative geometries. *Geode* is a collaborative effort to fuse public sculpture, soundscape and visual projection into one immersive experience.



Geode, video mapping, sound, cardboard, 2016. (© Esteban Garcia Bravo, Maxwell Carlson, Aaron Zernack and Jorge Garcia)

California Drought Impact, interactive data visualization, 2016. (© Yoon Chung Han and Shankar Tiwari)

CALIFORNIA DROUGHT IMPACT (VISAP'16)

Yoon Chung Han and Shankar Tiwari

Web: www.yoonchunghan.com

California Drought Impact visualizes and sonifies California's drought using physical data sculptures and projection-mapped images. It depicts the causes and impact of the drought and promotes awareness of water consumption. The installation offers the viewer an opportunity to experience a metamorphosis of water morphology and its impact on the drought, caused by climate change. Viewers can explore how the drought has been created over time and can simulate its behavior. *California Drought Impact* encourages good environmental stewardship using the hybrid practices of art and design.

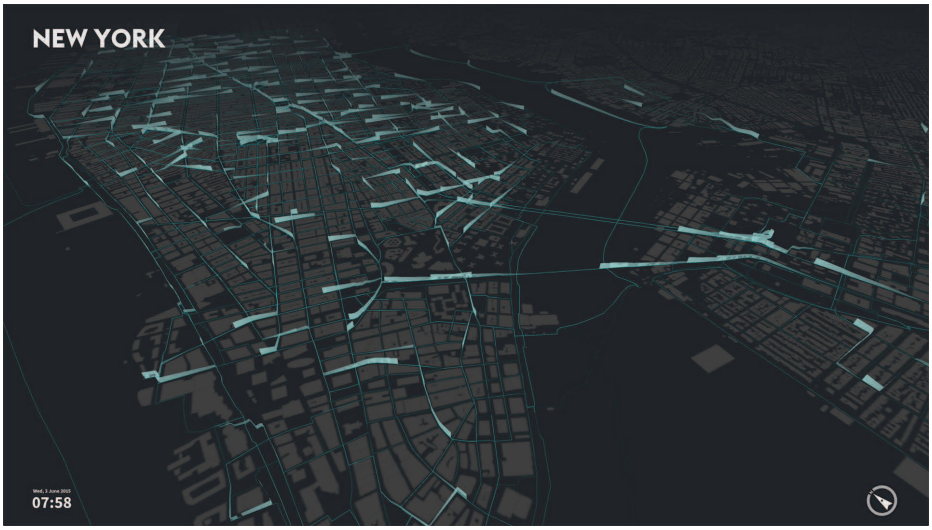
CF. CITY FLOWS (VISAP'16)

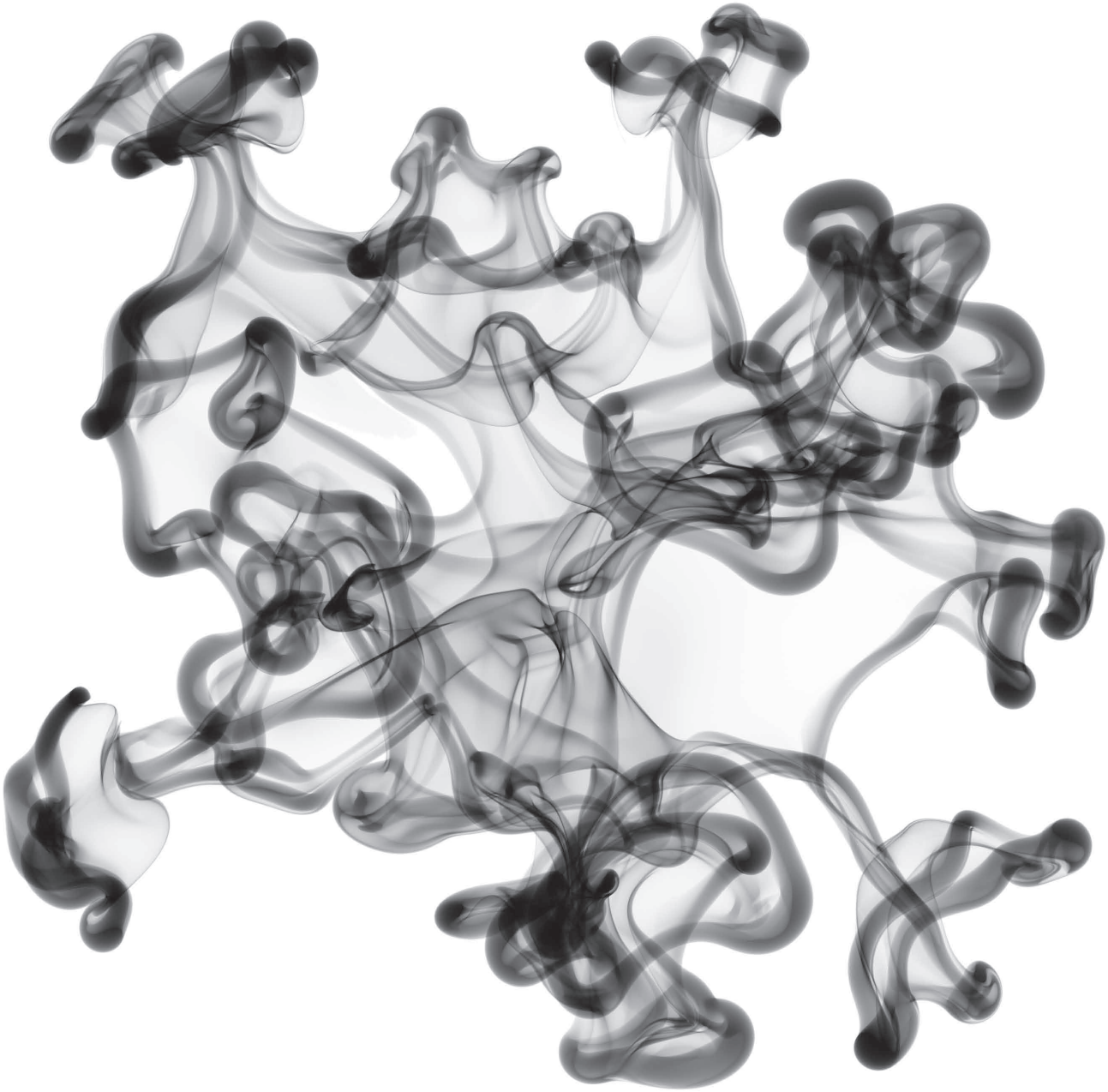
Till Nagel and Christopher Pietsch

Web: https://uclab.fh-potsdam.de/cf

cf. city flows is a comparative visualization environment of urban bike mobility designed to help citizens casually analyze bike-sharing systems in the context of a public exhibition space. Three high-resolution screens show the space of flows in New York City, Berlin and London. By showing the flow of multiple cities side by side, we can compare their extent and dynamics. Tracing urban movements accentuates different urban structures and enables us to observe similarities and differences in various bike-sharing systems. *cf. city flows* applies established mapping and visualization techniques within a highly aesthetic framework in order to encourage visitors to engage with the spatiotemporal complexity of urban mobility. Through our visualizations, we can better understand the pulse of urban mobility and create portraits of a city defined by its transient dynamics.

cf. city flows, rendered visualization (digital), 2015–2016. (© Till Nagel)





Chaotic Escape, digital chromogenic print, 2015. (© Mark J. Stock)

TRIPLE FLUID COLLISION **and *CHAOTIC ESCAPE*** (VISAP'16)

Mark J. Stock

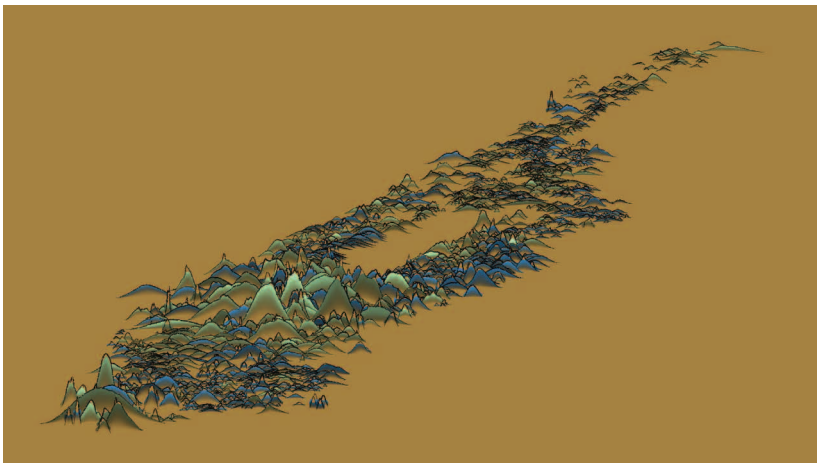
Web: www.markjstock.org

Triple Fluid Collision and *Chaotic Escape* originated as simulations of interfaces in fluids. In the *Chaotic Escape* series, a density interface reacts under the influence of radial gravity, where minuscule imperfections in the initially spherical surface grow and expand, reaching ever outward as the enclosing fluid seeks the center. *Triple Fluid Collision* is a series of Selective Laser Sintered 3D-printed sculptures, each representing the turbulent collision of three spheres of fluid. In crashing together, the smooth shapes stretch, fold and entangle themselves in one another, leaving an inseparable mass. The rigidity of the print and the planar nature of its construction stand in clear opposition to the ephemerality of the phenomenon and its virtual origins.

SHAN SHUI IN THE WORLD (VISAP'16)

Weili Shi *Web: www.shi-weili.com*

Shan Shui in the World revisits the ideas implicit in Chinese literati paintings of *shan shui*: the relationship between urban life and people's yearning for nature, between social responsibility and spiritual purity. For an audience living in an urban area, a traditional *shan shui* painting provides spiritual support through the depiction of a natural scene. With generative technology, however, *Shan Shui in the World* has the ability to represent any place in the world—including the venue city—in the form of a *shan shui* painting based on geography-related information of the place. The notion that *shan shui* can exist right here (within a generative parallel world) not only underscores the contrast between the artificial world and nature but also reminds the audience of an alternative approach to spiritual strength.



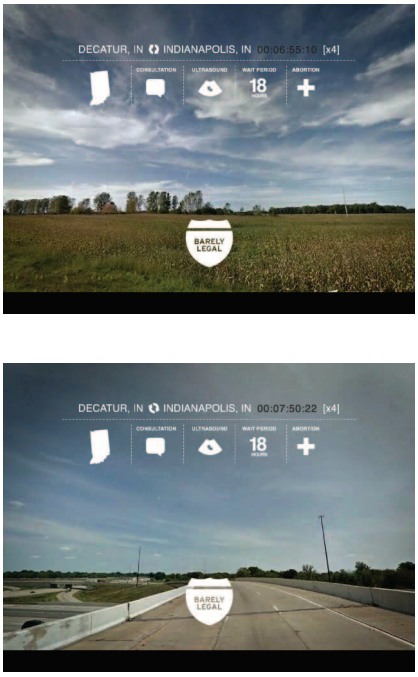
Shan Shui in the World,
ink and colors on silk or paper, 2016.
(© Weili Shi)

barelyLegal_ (VISAP'16)

Jessica Parris Westbrook and Adam Trowbridge

Web: www.onchanneltwo.com

*barelyLegal_* is a series of data-driven desktop documentary "drives" tracing actual routes for obtaining safe legal abortions for women in the United States. *barelyLegal_* is data visualization or experiential data in the spirit of very long-form conceptual video art. Combining social and physical landscape, each of the videos in the project runs for the entire length of time it takes to drive to and from a location where a person can receive a safe and legal abortion. *barelyLegal_* is an ongoing project that was begun in January 2015, seven months before anti–Planned Parenthood propaganda videos once again put abortion in the media spotlight.



barelyLegal_IN, video, 2016. (© Jessica Parris Westbrook and Adam Trowbridge)

VIDEO VOTO MATIC (VISAP'16)

Mike Richison

Web: www.mikerichison.com

The *Video Voto Matic* installation encourages voters to generate rhythms with video clips sampled from the 2016 U.S. presidential race. A sequence of segments extracted from candidates' speeches and other election-related footage is used to create custom video loops. Instead of a voting machine providing the names of candidates, the voting booklet is filled with sample drum patterns. Voters can follow the patterns suggested by the booklet or punch in their own, choosing samples of words, phrases, breaths, pauses and other sounds and silences in order to build percussion tracks, melodies and solos. The installation presents a mashup of the legendary Roland TR 808 drum machine and the punch card–style Votomatic voting booths used during the 2000 Bush-versus-Gore Florida election debacle.

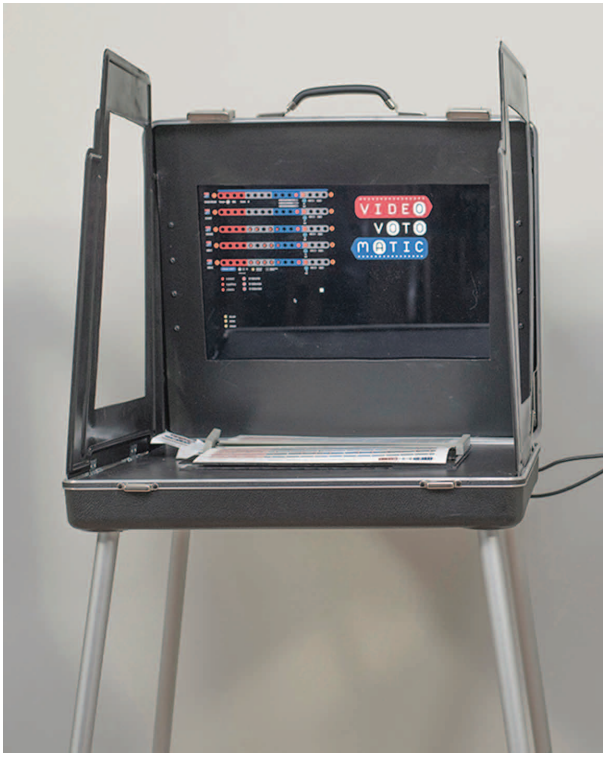


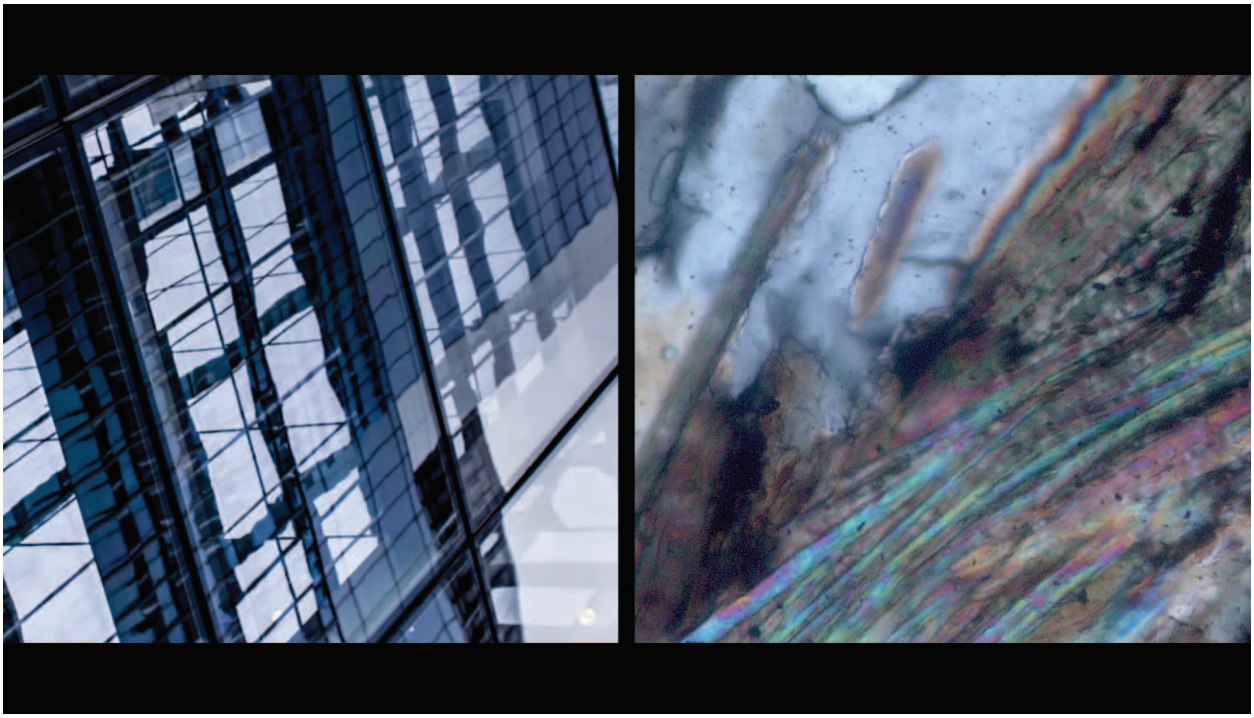
Photo from *Video Voto Matic*, 2016. (© Mike Richison)

MINERAL MACHINE MUSIC (VISAP'16)

Mitch Goodwin and Clement Fay

Web: www.mitchgoodwin.com

Mineral Machine Music is an aesthetic exploration of the fabric of the earth as seen from the stage of the microscope and the lens of the industrialized city. The work juxtaposes the man-made structural textures of the New York cityscape with the geological mineral formations from the South Australian outback. Blending cityscape with substrate, *Mineral Machine Music* complements the imagery with layers of sonic noise—musical representations of tectonic activity, echoes of the universe from deep space and the groans of the restless earth juxtaposed against the industrial machine ambiance of a New York City subway.



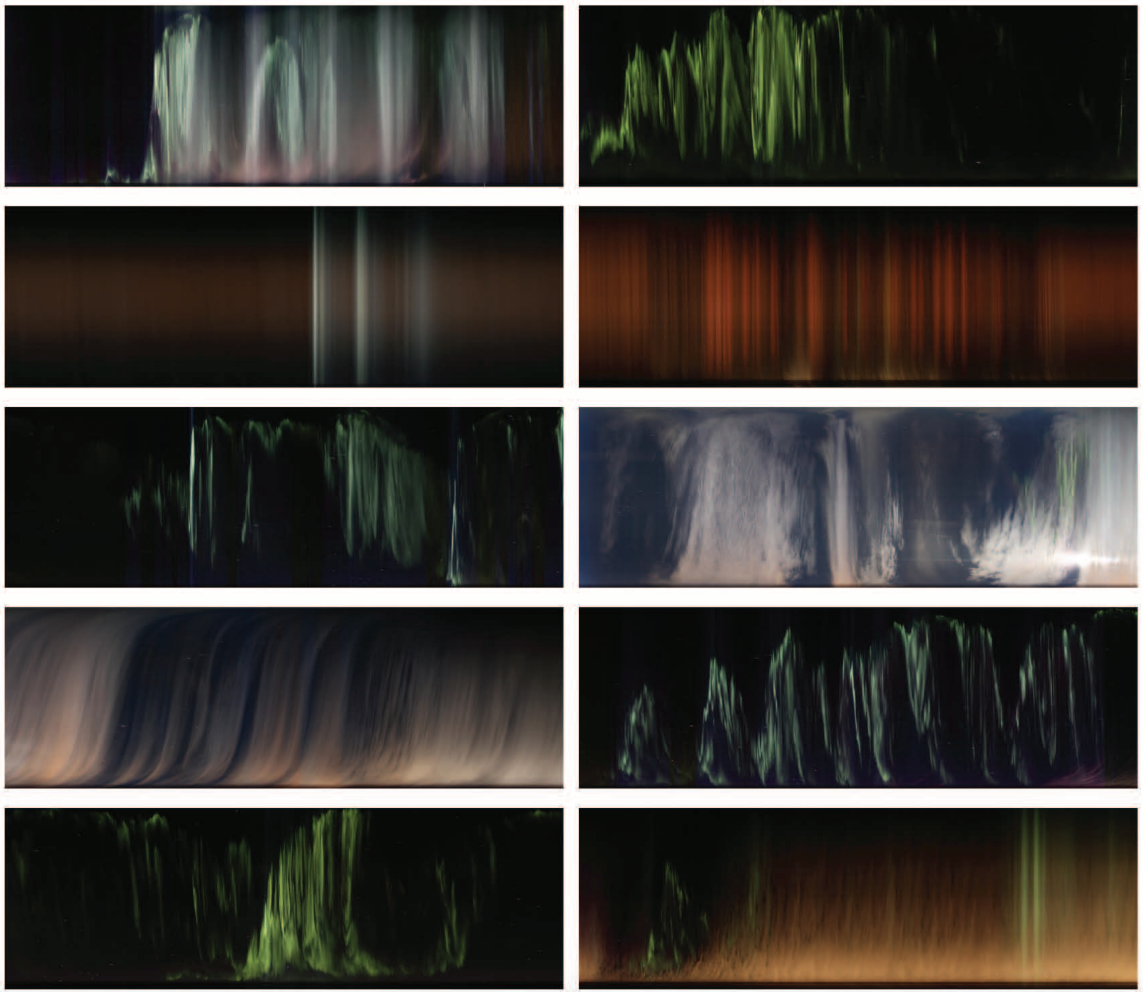
Screenshot of *Mineral Machine Music*, street photography and video assemblage, 2014: a high-resolution photo-micrograph in cross-polarized light, muscovite and biotite. Differences in color are due to pleochroism, an optical phenomenon in which the color of the mineral changes depending on the angle of view (the incidence of the light and crystallographic axis). (© Mitch Goodwin. Street photography by Mitch Goodwin. Microscopic imagery by Clement Fay.)

SLICING THE AURORA (VISAP'16)

Sebastian Lay, Jo Vermeulen, Charles Perin, Eric Donovan, Raimund Dachselt and Sheelagh Carpendale

Web: www.innovis.cpsc.ucalgary.ca

Slicing the Aurora consists of large-scale digital prints generated from a sequence of photographs of the northern sky taken over the course of one night. Each image is aggregated over time, creating visually appealing and intriguing images—or Keograms—that visualize Aurora Borealis (Northern Lights) activity as well as interesting movements of clouds and stars that occurred that night. The word *Keogram* is derived from *Keoeeit,* the Inuit word for the Aurora Borealis. A Keogram is an image that represents a series of images taken over the course of one night; the timeline starts with the evening on the left and ends with the next morning on the right.



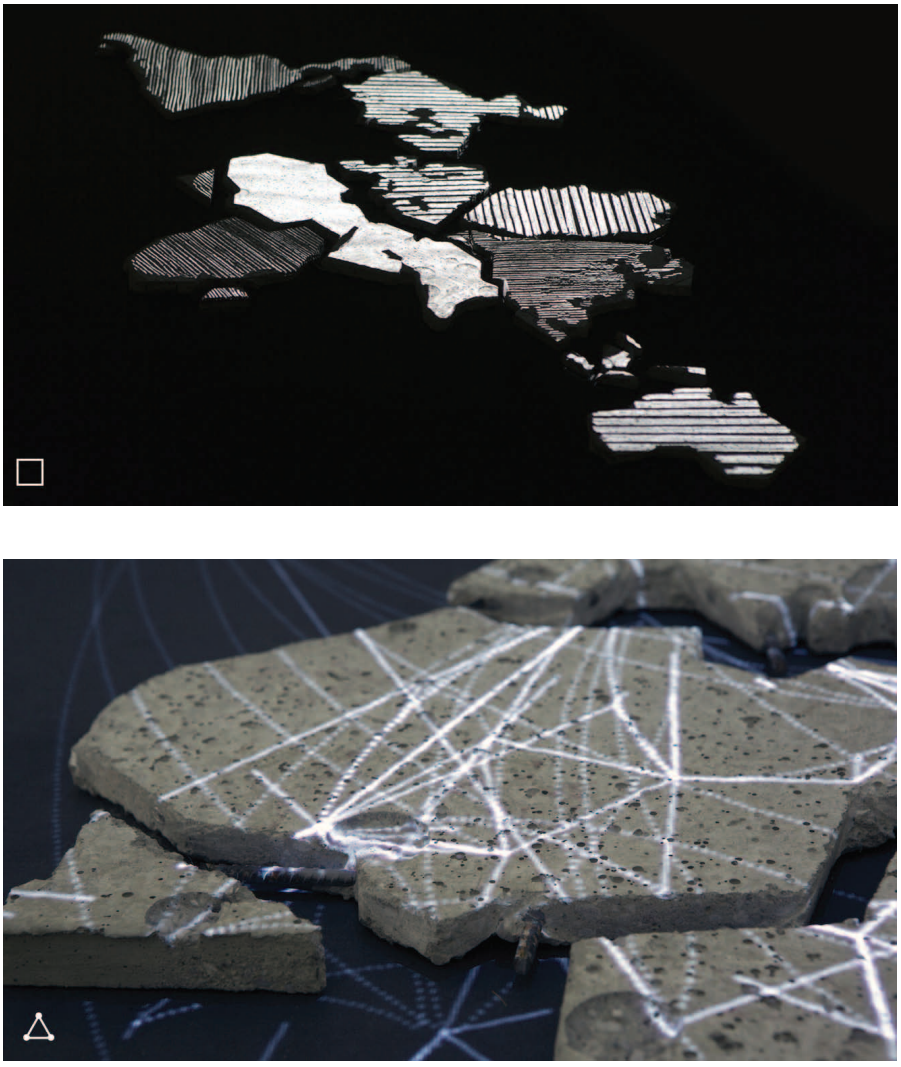
Slicing the Aurora, digital media. (© Sebastian Lay)

PASSIM (VISAP'16)

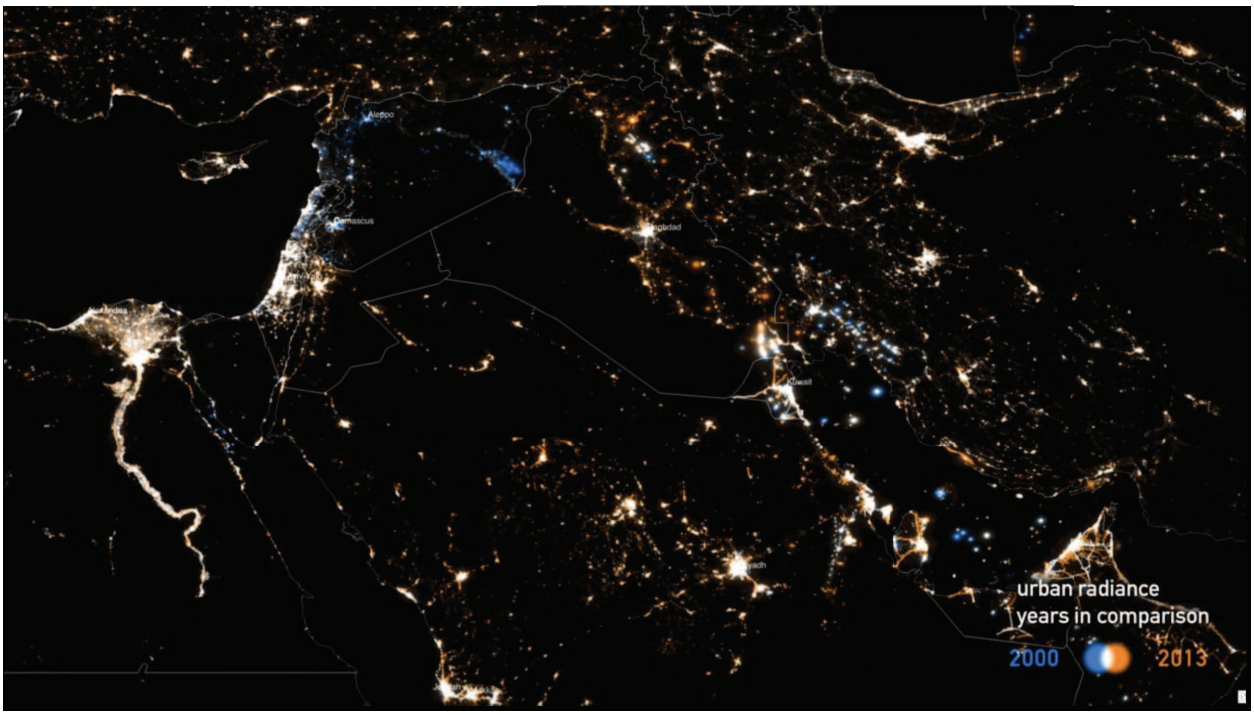
Paul Heinicker

Web: www.passim.paulheinicker.com

Passim is a visual reflection of the humanistic discourse regarding space that connects the elements of design sciences and cultural theories. Through research into and implementation of four major spatial theories (absolute, relative, relational and topological), the project proposes to understand space through a sociopolitical lens. The installation explores the relationship of these four notions by projecting visualizations of geopolitical data (collected from the Heidelberg Institute for International Conflict Research) onto physical sculptures. The result of these reflections creates different worldviews that represent self-aware images, in contrast to the usual biased techno-positivism of visualizations. These reflections demonstrate how notions of space directly influence recent geopolitical events (such as the refugee crisis) and how spatial theory can be used to rethink global political constellations.



Passim (details: absolute space / relative space), 2015. (© Paul Heinicker)



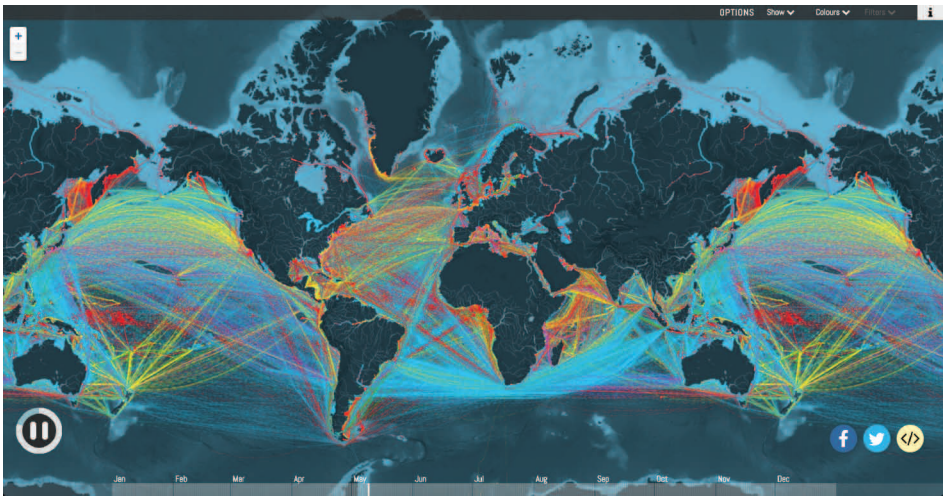
Urban Radiance Middle East, digital media, 2017. (© Dietmar Offenhuber)

URBAN RADIANCE (VISAP'16)

Dietmar Offenhuber

Web: www.offenhuber.net

Urban Radiance is the first interactive visualization of radiance time series data. Global datasets that estimate population density, economic productivity, measles outbreaks, rural poverty, resource footprints and electrification rates, urbanization and suburbanization, and average wages are all derived from nighttime imagery of city lights captured by the Operational Line Scanner (OLS) sensor on satellites from the U.S. Defense Meteorological Satellite Program (DMSP). What would later become the workhorse of geographers and economists was initially a completely accidental byproduct of a cold-war era military satellite program launched in the 1950s by the U.S. Air Force for estimating cloud cover and precipitation for reconnaissance missions. Army engineers discovered that the sensors were sensitive enough to capture artificial radiance of cities during moonless nights without cloud cover. While DPMS images are usually used to show regional differences, *Urban Radiance* visualizes the temporal change in radiance from 1992 to 2015, along with a comparison to country-level GDP and population data from the UN.



Duncan Clark and Robin Houston, capture from www.shipmap.org website, 2016. (Map © Kiln.digital with data from UCL EI and ExactEarth)

THE SHIP MAP (VISAP'16)

Duncan Clark, Robin Houston and Tristan Smith

Web: www.kiln.digital/projects/shipmap

The Ship Map is an ambitious interactive map of commercial shipping movements based on hundreds of millions of data points from throughout 2012 (the most recent year for which all the raw input data was available). The project's aim is to highlight for a broad audience the extraordinary scale of modern commercial shipping, the routes these huge vessels take around the world, the geographic spread of different types of cargo boats and the amount of carbon dioxide they produce. The unique base map shows ocean depth and major rivers, while the ships can be viewed as a high-resolution animation of movements over time (the "ships" view) or as a plot showing all positions at once (the "routes" view), optionally color-coded by ship type.

THE SKY IS FALLING . . . (VISAP'17)

Adriene Jenik *Web: http://ajenik.faculty.asu.edu*

The Sky Is Falling . . . is the third in an ongoing series of performances that make up The Data Humanization Project. The Data Humanization Project reasserts the connection of data to human scale and context. In contrast to the contemporary trend toward visualizing big data, each "data humanization" performance seeks to physically translate a single data point so that it can be more fully comprehended. The chosen data points are ones that trouble or baffle the artist, which she seeks to imprint within her body. The artist invites her audiences to serve as witnesses. The data chosen for *The Sky Is Falling . . .* is the number of civilians killed as a result of drone strikes by the U.S. military. This number is contested: The low estimate of civilian deaths by drone strikes recorded in Pakistan (since 2004), Yemen (since 2002), Somalia (since 2007) and Afghanistan (since 2015) totals 616. *The Sky Is Falling . . .* was performed from sunup to sundown on 13 November 2016.

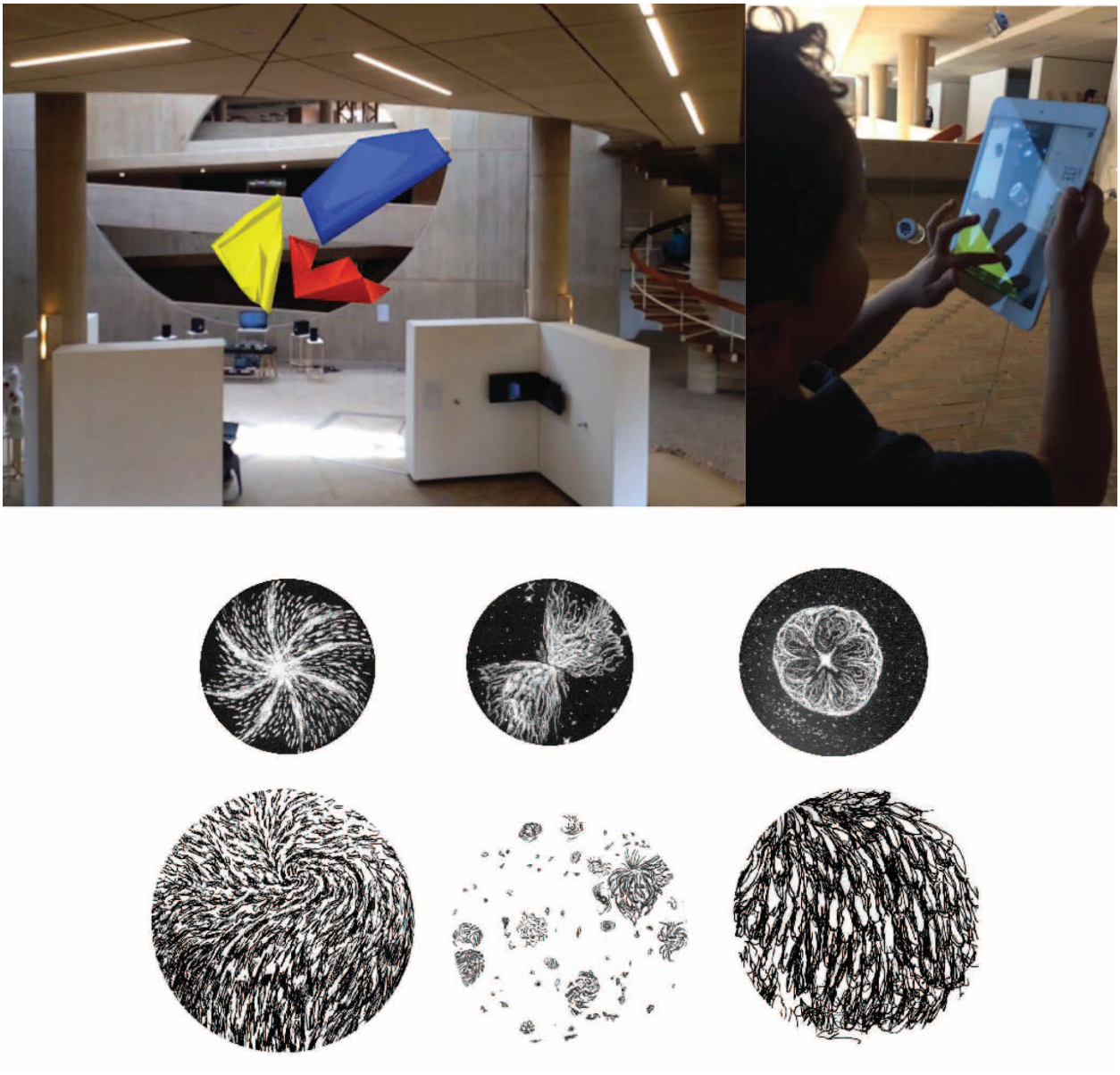
The Sky Is Falling . . . livestreamed endurance performance, 13 November 2016. (© Adriene Jenik)

INTERSTELLAR: CROSS-SCALE SPACE-SCAPES (VISAP'17)

Clarissa Ribeiro, Mick Lorusso and Herbert Rocha

Web: www.clarissaribeiro.com

Conceived as a peaceful and playful exploration of interstellar space, this augmented reality and sound installation invites the audience to access the experiential dimension of space technologies and to explore how the huge amount of data derived from space exploration can be appropriated and integrated into the artist's poetics. Walking through the installation holding an iPad Mini, the visitor will find themselves immersed in a soundscape populated with 3D models derived from actual microscale images. The 3D models were generated via parametric design strategies from the NASA Stardust Discovery-class mission's image database of aerogel samples, which have captured cosmic dust particles. The mission was the first to return samples from a comet and from interstellar space.



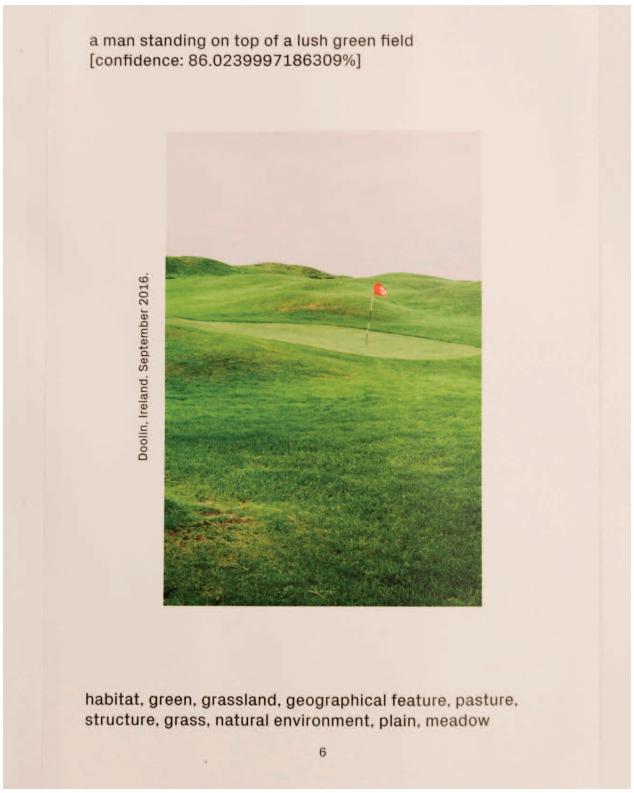
Interstellar. (© Clarissa Ribeiro Pereira de Almeida)

COMPUTED CURATION (VISAP'17)

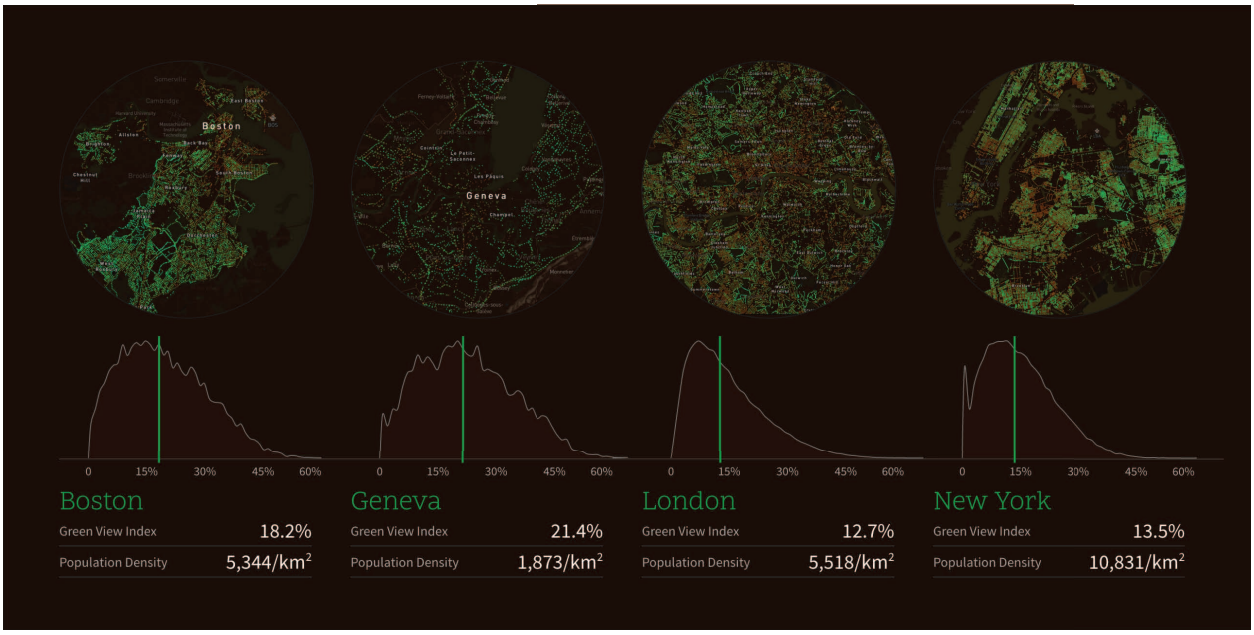
Philipp Schmitt

Web: www.philippschmitt.com

Computed Curation is a photobook created by a computer. Taking the human editor out of the loop, the curation process uses machine learning and computer vision tools to automatically select a series of photos from an archive of pictures. Machine-learning–based image-recognition tools are already adept at recognizing training images (umbrella, dog on a beach, car), but their flaws and biases are exposed when tasked with more complex input. In *Computed Curation*, these flaws surface in often bizarre and sometimes poetic captions, tags and connections. Moreover, by urging the viewer to speculate on the logic behind its arrangement, the book teaches how to see the world through the eyes of an algorithm. In this sense, *Computed Curation* is not a data visualization in the most literal way but a piece of data art offering a glimpse into the metrics, aesthetics and poetry of machine learning, computer vision and visualization tools.



Philipp Schmitt, *Computed Curation*, 2017. (© Philipp Schmitt)



Wonyoung So, Carlo Ratti, Xiaojiang Li, Ian Seifeling and Newsha Ghaeli, *Treepedia*. (© MIT Senseable City Lab)

TREEPEDIA (VISAP'17)

Wonyoung So *Web: http://wonyoung.so*

A city's tree canopy is an important and integral part of urban life. However, citizens are often removed from understanding the distribution and makeup of their neighborhood's or city's trees. *Treepedia* aims to examine cities' greenery by developing a metric called Green View Index, making it possible to see the difference between streets and cities as a whole. The Green View Index utilizes Google Street View panoramas and provides a platform by means of which cities can evaluate and compare green canopy coverage. Through this platform, viewers are able to get a better sense of how people on a street perceive the trees. It enables scientists, planners and citizens alike to explore the urban tree canopy and to take action to improve it.

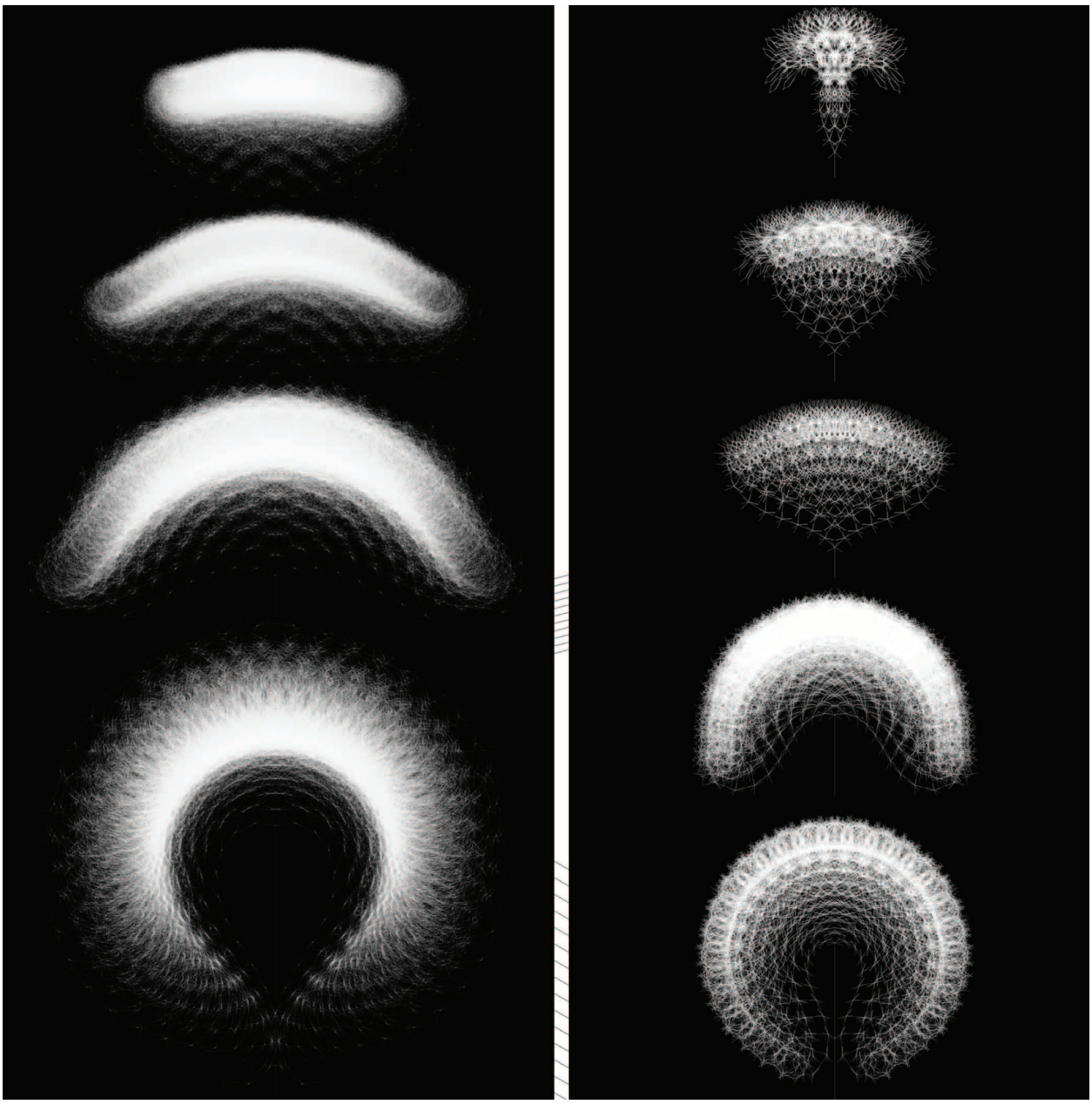
Mauro Martino, Hendrik Strobelt, Owen Cornec (IMB Research AI) and Jonas Jongehan (Google Creative Lab), *Forma Fluens: abstraction, simultaneity and symbolization in drawings*, 2017. (© Mauro Martino)

FORMA FLUENS (VISAP'17)

Mauro Martino, Hendrik Strobelt and Owen Cornec

Web: www.formafluens.io

Forma Fluens (Latin for "flowing form") reveals an overlapping collection of drawings generated by over 100,000 authors. Each image is slightly different—in the words of William Blake, "Every eye sees differently"—but when viewed as a collection, the drawings self-correct and an iconographic image of the represented object emerges. All those varieties of drawings push us to expand our idea of beauty. These 100,000 people work as one, obtaining a dynamic, unfinished effect, which nonetheless is able to convey lifelike objects. That is, this crowd-generated drawing lets each form flow—*forma fluens*.



Scottie Chih-Chieh Huang, *The Ghost in the Dandelion*, 2015. (© ZKM | Center for Art and Media Karlsruhe. Photo © Anatole Serexhe.)

THE GHOST IN THE DANDELION (VISAP'17)

Scottie Chih-Chieh Huang and Yu-Chun Huang

Web: www.scottiehuang.com

The Ghost in the Dandelion is an interactive installation that incorporates physiological measurement. A biosensor analyzes a viewer's facial expressions and converts them to a poetic visual representation in the form of an animated dandelion displayed on a mirrored surface. The mirror both reflects the image of a person and functions as a presentation screen. Using a generative algorithm, the animated dandelion "blooms" once it perceives a viewer standing in front of the screen, showing a range of diverse forms and behaviors that are controlled by the viewer's expression. These visual patterns emphasize the symbiosis of data visualization and human mirroring.

SPATIAL MAGNETIC FIELD VISUALIZATION (VISAP'17)

Inhye Lee and Hyomin Kim

Web: www.inhyelee.com

Spatial Magnetic Field Visualization is a kinetic art installation consisting of three-axis solenoids and a three-dimensional grid of ball compasses visualizing the unseen forces of magnetic field changes. The solenoids are connected to an Arduino-based system programmed to generate magnetic fields either from recorded science data or via a magnetometer that detects ambient magnetic fields and provides real-time measurements. It is a physical space that emulates the electromagnetic connection between the Sun and Earth and the invisible yet ubiquitous forces in nature that have a profound effect on us residing on Earth. The impact of what is now called "space weather" on human life and technology (e.g. GPS, radio communication, power transmission, etc.) is substantial, and one purpose behind this project is to create conversations about this issue.

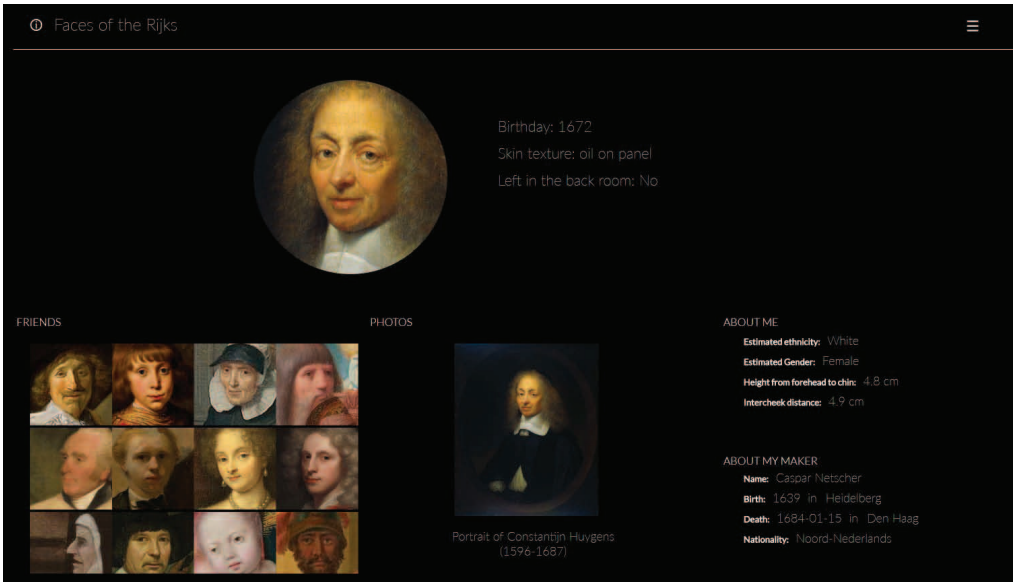
Spatial Magnetic Field Visualization, interactive visualization, 2016. (© Inhye Lee and Hyomin Kim)

VIJKS: HIDDEN DIMENSIONS (VISAP'17)

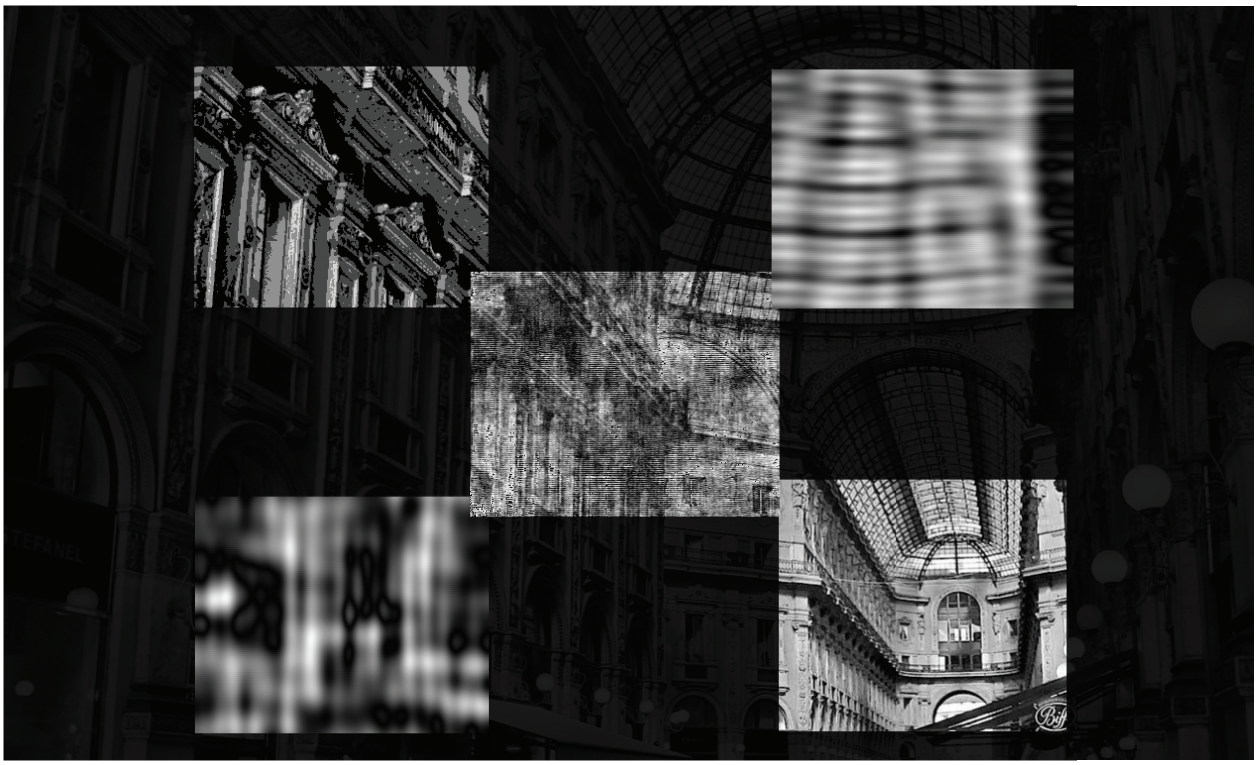
Pierre Amelot, John Hwong and Kate McManus

Web: www.vijks.com

Museums exhibit much art, yet a large portion of their collections remain in storage and out of view. *Vijks* explores ways to make this "hidden" art accessible to the general public and enables new ways of interacting with it. Specifically, *Vijks* presents data about the collection of the Rijksmuseum, the largest art museum in Amsterdam, noted for masterpieces by Rembrandt, Frans Hals and Johannes Vermeer as well as for its forward-thinking digital initiatives. Using the Rijksmuseum's API, *Vijks* enables users to digitally explore and interact with its collection using four novel web-based exhibits.



Vijks. (© Pierre Amelot, John Hwong and Kate McManus)



VOSIS app screen shot. (© Ryan McGee)

VOSIS (VISAP'17)

Ryan McGee

Web: www.lifeorange.com

VOSIS is a live audiovisual performance and software installation involving audification of pixel data from black-and-white photographs, videos and live camera streams. Rather than emphasizing visualization of sound, *VOSIS* inverts typical paradigms to explore the sonification of imagery. The *VOSIS* iPad app allows for real-time, spatial sound synthesis via pixel filtering and manipulation. Gray-scale pixel values are scanned as audio waveforms, and all filtering is applied to the imagery rather than the sound. This method produces an objective, rather than subjective, connection between visuals and the sounds they produce. As color is not of consideration, visual shape becomes most deterministic of sound timbre.

Mary Neubauer, *Data Visualizations*, bronze, 2 × 2 × 2.5 in. to 3 × 4 × 12 in. (© Mary Neubauer. Photo © Damian Johnson.)

DATA VISUALIZATIONS (VISAP'17)

Mary Bates Neubauer

Web: www.marybatesneubauer.com

The *Data Visualizations* sculpture series focuses on the hidden aspects of our surroundings, emphasizing artistic and tactile ways of understanding global and metropolitan functions based on data visualization. New ways of seeing our natural and built environments are made possible through the dimensional, visually appealing expression of the many streams of numbers that constantly input from our environment, evoking an expanded awareness of systems, cities, timelines and the rhythms of the larger world. These data-responsive sculptures serve as an aid to a more deeply felt understanding of the complex attributes of the environments in which we live today. The work is designed to provide a highly visual interpretation of the behavior of data through time while remaining true to the underlying input driving the visuals.