

It's all in your head

NEURODOME

By Julia Buntaine
Editor-in-Chief

Exploration lies at the heart of art and science; each in its own way investigates the worlds around us and inside of us, revealing scientific and artistic truths and perspectives that broaden our knowledge, deepen our experiences, and enrich our lives.

As we reach out into space to investigate the potential of life on other planets, we are also exploring other uncharted territories; the ocean remains largely unknown, a strange fact given its relative easy access. Similarly, the brain is also a secret world unto its own, where the most cutting-edge neuroscience on the molecular to the network level has barely scraped the surface of what many would deem the greatest puzzle in today's science.

Neurodome, co-founded by Jonathan Fisher, Aaron Steiner, and Joshua Salvi, brings the scientific exploration of the brain to the public through the spectacular medium of the planetarium show. Replacing 'universe' imagery with that of the brain, Neurodome brings its audience inside a computer-rendered brain based on the latest neuroscience has to offer. Fisher, the Director of Neurodome, took the time to answer a few questions *SciArt* had about the art, science, and story behind Neurodome:

Julia Buntaine: *What sparked you to found Neurodome—what hole was there in neuroscience outreach and education that you think Neurodome fills?*

Jonathan Fisher: Neuroscience has a very strong presence in pop science. It appeals to fairly universal, subjective concepts like the way we experience the world and what it means to be human. Increasingly, there is hard science showing that some aspect of the way you experience

things has some biological underpinning. The way the public views depression and mental illness, for example, has really changed. Depression isn't really seen as a weakness of character anymore.

But most people don't actually have any sort of visual relationship with this inner 'frontier'. If you talk about astronomy, everyone has an intuitive picture of stars, blackness, spacecrafts, planets, gravity, etc. Meanwhile, we have the basis for our entire conscious experience inside of our heads, right here on Earth to explore...and what are people visually thinking about when you talk about neuroscience? Of course, people envision a wrinkly, helmet-shaped loaf of tissue. Just Google the name of any magazine or news source you trust "+ brain" and you'll find that most of the articles about the brain have illustrations that fit that general concept.

People who work in brain science have a pretty versatile picture of the brain at multiple scales, a good spatial sense. But that actually takes a long time to develop, a lot of exposure to imagery in multiple contexts. Fortunately, immersive projection and virtual reality gives you a physiological 'cheat'. When you lose sight of the horizon through immersive visualization environments (planetarium, digital 'caves', VR headsets, etc.), conflicting vestibular and visual cues give you the experience of movement—a phenomenon called vection. This experience is extremely physically engaging, that's why some people say you don't really 'get' VR unless you actually experience it.

In the Neurodome project, we leverage this experience. As we've found, immersive experience of brain data really engages people who don't otherwise care about the brain.

*Background: From "brainback" hackathon sponsored by BCI montreal.
Credit: NeurotechX*



Viewing diffusion tensor imaging (DTI) dataset. At iX Symposium (Immersion / Expérience), Société des Arts Technologiques, Montréal, Canada, 2015. Photo credit: Sébastien Roy.



Viewing 2-photon dataset of cortical pyramidal neurons. At iX Symposium (Immersion / Expérience), Société des Arts Technologiques, Montréal, Canada, 2015. Photo credit: Sébastien Roy.

But you really need the immersive environment; when we do events on flat screen (which I generally do not do anymore), people are entertained—but not inspired.

JB: *What's the most fun part of your job?*

JF: One of my favorite activities is building teams to work on inspiring projects. Since nobody, no one lab generally has the technology, resources, or expertise to accomplish hard scientific problems, I like thinking about who I can recruit so that there's something scientifically in it for everyone and that people can let their strengths shine. One of the first things I do in the team-building process is envision our victory party.

JB: *What do you see in the future for Neurodome?*

JF: The one limitation of the dome is distribution. There are not very many digital domes. Most people don't really have access. Most of my friends have actually never been to a Neurodome event because there has not been a show at the right time and in the right place. So now we are converting our content to spherical rendering for VR, in particular Google Cardboard.

Another important direction is making real-time navigation portable and free. Currently we achieve this free-flight for audiences using Uniview. This is great and the company that creates it, SCISS, has contributed tremendously to the development.

Learn more about Neurodome at www.neurodome.org.