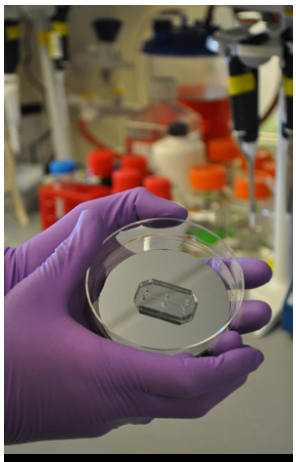
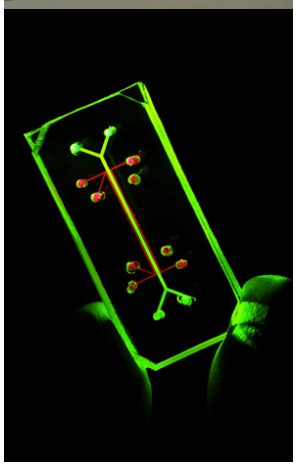
Science and Art Shape the Future in Boston





By Alberta Chu
Guest Contributor

Science, art, technology, and design are intersecting, colliding, transforming, and fusing in established science laboratories as well as in new experimental venues in the Boston area. The inertia of thriving academics, innovative science museums, and public arts programs has gained momentum over the past decade. As we explore Kendall Square in Cambridge, Massachusetts Institute of Technology (MIT), Harvard University's Wyss Institute, and the Museum of Science, we find that scientists and artists—sometimes one and the same—are at it like never before in a town that cultivates and celebrates what happens at the intersection between the two.

Science by Design

The Wyss Institute for biologically inspired engineering at Harvard is the embodiment of science-based art. For Wyss Institute Founding Director, Don Ingber, "Design is central to my science." He recalls, "As an undergraduate at Yale, I took a class in sculpture and learned of the ideas of Buckminster Fuller and Kenneth Snelsen. That was my a-ha moment. Over the next thirty years, I did experiments applying the concept of tensegrity to biology and cells."

That Dr. Ingber lives at the design-art-science interface is evident in his approach to answering big scientific questions. In his research, Ingber envisions the essence of the organ, then builds it by the simplest means. With a nod to Buckminster Fuller, Ingber says, "You chip away at the incredible complexity of life to reveal the essence of it. Not only meaning but also mechanism, and not only to make a model but to be able to use that model to make predictions." Dr. Ingber's work, in which he grows living cells on computer chips, shows that the cells begin to exhibit emergent behaviors, just like cells in the body's organs, that specialize and work to function together. Surprisingly, Ingber's work has been embraced by the design world. *Organs on Chips* can be seen at MoMA in New York City in the current exhibition "This is for Everyone: Design for the Common Good," curated by Paula Antonelli, MoMA's Senior Curator of Architecture and Design. Additionally, MoMA has acquired *Organs on Chips* for their permanent collection. "That was certainly a dream, but not an intention," Ingber remarked happily.

When Don Ingber met David Edwards, the two immediately realized their art-science connection and began to produce public events, programs, and book projects together. Ingber makes the point, "Great scientists are like great artists. They have vision: the ability to envision is important in all great discoveries."

Boston is buzzing about Le Laboratoire Cambridge, the hybrid art gallery, restaurant, and lecture venue in Kendall Square conceived by David Edwards also of the Wyss Institute, who is also director of Le Laboratoire's first branch in Paris. Edwards explains, "Many of the questions facing us about innovation and change can no longer be dealt with in a classical lab setting. We are opening the creative process up to the public." A splashy red-carpet worthy opening in the fall featured performances of *Vocal Vibrations*, a collaboration between architect and designer Neri Oxman and composer and inventor Todd Machover (both of MIT Media lab), drawing celebrated area technology and design cognoscenti. With world-renowned chef Patrick Campbell (previously of No. 9 Park) at the helm and featuring coffee from Parisian coffee roaster Antoine Nétien, Le Laboratoire Cambridge/ Café ArtScience is a unique destination for

Above: Organs on Chips *recently acquired by MoMA NY.*
Photo credits: Wyss Institute at Harvard University.

Opening night at Le Laboratoire Cambridge. Photo Credit: Phase One Photography.

creative thinkers to relax, enjoy, and schmooze. Bartender Todd Maul and his staff create cocktails that owe a debt to science. The bar is equipped with its own centrifuge and supply of liquid nitrogen. Le Lab, as it's become known, has quickly become the place where artists, scientists, engineers, entrepreneurs and designers go to 'see and be seen'.

The space itself is unique in that every element seems designed to create desire. The sleek minimal space by Mathieu Lehanneur is composed of distinct components: Le Laboratoire art exhibition space, Café ArtScience and Bar, and the Honeycomb, where Harvard lectures and public programs for the Wyss often take place. Wyss scientist L. Mahadevan speaks on "Shapes and Flows of Nature" at the Le Laboratoire Honeycomb on May 20.

Don Ingber says, "The Wyss Institute empowers our scientists to ask the big questions and cross all the lines—it happens all the time. Edwards is creating a space for it to happen and translate it into impact, to empower people to follow their passions." Edwards describes his vision: "Experiments at Le Laboratoire Cambridge are about the creative process that is taking place at the intersection of science, art, and technology. We work with creators from a wide range of fields—scientists, designers, artists, musicians, chefs, et cetera—which enable us to explore ideas in a very meaningful way."

Ingber sums it up, "Really good people who try to solve mega-problems in the world have to cross boundaries. Le Laboratoire is an experiment to try to open up challenges to bring the tech sector and art sector together."

The strategic location of Le Lab Cambridge in Kendall Square—one of the most technology-dense places in the world and just steps from the MIT campus—is no accident. It is an area brimming with tech entrepreneurs, scientists, and engineers. According to Ingber, "You have

different types of creativity in the art and design world, and the two don't often intersect but Le Lab provides a space for the two to collide." Connecting cutting-edge scientific research and technological innovation to people is one of the goals of Le Laboratoire.

When Science Meets Art

Boston's Museum of Science (MOS) has discovered that the intersection of art and science can be an effective way to attract new audiences. Speaking about the goal of designing programs to cultivate new audiences and attract people who are not scientists, Lisa Monrose, Special Events Program Producer at the MOS says, "Art and the mash-up of science and art offer a different door through which to enter the world of science." Monrose initiated the MOS' highly successful "When Science Meets Art" series ten years ago, and it is ongoing. The series has featured luminaries in both art and science—and events are curated to highlight film, fashion, and performances. "When Science Meets Art" at the MOS is a hot ticket, often selling out events the same day tickets go on sale. Unsurprisingly, on April 29th the series will put the spotlight on Le Lab's David Edwards.

Museum of Science Events: David Edwards — Eating Bottles, Drinking Clouds, and Texting Your Evening Meal on April 29, 2015. Photo Credit: Phase One Photography.

Monrose observes, "Art in all its media—visual and sound art, performance, installation, film, fashion, et cetera—provides opportunities for people to learn through emotional and contemplative experiences, not just through intellect. My goal is to produce art experiences that will introduce people to new perspectives that might shift their understanding of our world and unleash their imaginations."

Edwards posits, "These kinds of art-science explorations might be relevant to the future of science, engineering, and medical research in that they chart a longer course of inquiry and introduce this inquiry into cultural, publicly engaged environments, where ideas can be shared, discussed, experienced by the public in a way that is not easily achieved in the classical peer-reviewed model. This can be particularly relevant at a time when the public is sensitive, sometimes fearful, in any case curious about the future—and wanting a role in shaping it."

Scientific Attractions

Another Wyss project, the research of scientist Wim Noorduin in collaboration with electron microscopist James Weaver, has recently received design acclaim. Their 'nano-flowers' were selected for inclusion in "Nature Made," a group exhibition curated by François Bernard at Maison & Objet Paris. "Francois wanted to show how people use natural processes to sculpt new shapes." Wim's reaction when he was first approached was, "What's going on here? I'm a chemist!" He adds, "I'm surprised that what we are doing on a micro scale is interesting to the world of architecture. It was very exciting—it was the first time we did something like that!"

Noorduin's research in Joanne Aizenberg's lab at the Wyss focuses on biomineralism: how organisms in nature build their highly intricate structures. He asks, "What are the ways to form these kinds of complexities?" Observing that organisms control their chemical environment, Noorduin thought that if he could control the environment, perhaps he could grow complex structures: "I needed to find a chemical reac-

tion sensitive enough to trigger pattern formation processes." The resulting pattern in solid state shows how carbonate salt with silica seed crystals nucleate and grow. Explaining his discovery, Noorduin observed that "changes to the environment impact the self-assembly process that's going on. Small changes in parameters make enormous changes in the shapes."

The nano-flower structures are half the width of a human hair. Samples the size of a postage stamp contain thousands and even up to millions of structures at the submicrometer level. At this level, scientific visualization is an extremely powerful tool. In this nano-scale research, the key analysis method is electron microscopy. Noorduin explains, "The first thing I do is put it in the electron microscope." Going further, Wim says, "It was really a struggle to show people how complex these structures are. I have learned a lot from James Weaver about how to visualize parts of the sample. The first time Weaver looked at viewed nano-flowers, he felt like he was 'diving in an ancient primordial coral reef.'"

Leading-edge electron microscopist James Weaver clarifies, "Visualizations like electron micrographs are science, not art." Noordin adds, "There's a lot of science behind the growing of these structures, but the cool thing is the visual result. After the *Science* (cover, May 17, 2013) paper came out, because of the visual attractiveness, we got attention from corners of the world we were not used to. It felt very special that a completely different group of people was interested in our research." Enthused, Wim says, "It's so gratifying to do this research and then have the research really connect with people!"

The Arts Are in the DNA at MIT

MIT is known to be a place to solve problems and explore science. However, the institute has long seen the value of artist and scientist collaborations. "While many schools now are interested in building cross-disciplinary programs, it has been embedded in the MIT culture since post-World War II and solidified under the leadership of [former institute president] Jerry Weisner" says Leila Kinney, Executive Director of Arts Initiatives and of the MIT Center for Art, Science, and Technology (CAST). Kinney continues, "The arts and humanities are fundamental to an education at MIT." With the CAST initiative launch in 2012, there is new enthusiasm for MIT's Visiting Artist Program. MIT visiting artists are nominated by research staff and selected by committee review. The roster of visiting artists include Tauba Auerbach, Vik Muniz, Trevor Paglin, Anne Lilly, Olafur Eliasson, Tomás Saraceno, Mel Chin, and Rick Lowe. Visiting artists may spend a semester at MIT, or visit occasionally over several years. It's inspiring being at MIT, as Kinney explains, "Artists come here to learn new things that resonate with their work." Tomás Saraceno (featured on the cover of *SciArt in America* in February 2015) has been a visiting artist since the program's inception and returns regularly. Saraceno will revisit MIT in April for the "Active Matter Summit: Programming Materials to Sense, Transform, and Self-Assemble," to be held at on April 24th and 25th, a conference organized by Skylar Tibbits and Athina Papadopoulou of the Self-Assembly Lab at MIT.

This year's visiting artist, Anicka Yi, explores ambiguities in sensual perception, meaning, and material. Anicka is making a diverse range of work in collaboration with MIT scientists. MIT CAST Producer of Artist Residencies and Public Programs Meg Rotzel works between artists and scientists, distilling what artists are interested in and helping to identify the appropriate scientist, explaining that "when you find two people who are excited, they ignite new questions." In 2012, Rotzel worked with MIT synthetic biology post-doctoral researcher Tal Danino to produce the collaboration with visiting artist Vik Muniz (2012–13) and knew Tal was eager for another project. "You need a scientist that has an open mind—to see beyond the research, who can ask the big open questions. Tal and Anicka found that together." Rotzel continues, "Tal does cutting-edge research with bacteria, Anicka was interested in working with living organisms, and the two hit it off." The resulting collaboration created *You Can Call Me F*, a perfume scent from the DNA of 100 women using genetically engineered bacteria as well as the visual display of bacterial samples. The work opened at the Kitchen in New York City on March 6th and is on view until April 11. Kinney emphasizes, "These are true collaborations. Something happens that has never happened before."

The Art and Science of Bacteria workshop: Anicka Yi and Tal Danino
Photo Credit: L. Barry Hetherington Arts at MIT

"What we're trying to do is to advance both the arts and the sciences. Illustrating science is not really the goal for us, we really want to work on the edge—to bring the two together in order to educate and excite each other and push the boundaries of both disciplines. We want artist and scientists to come together to further their research on both sides," explains Rotzel.

Alise Upitis, assistant curator at the MIT List Visual Arts Center (LVAC), finds that Yi's work exemplifies "irreducible ambiguity [and often] changes over time in unpredictable ways due to the environment." For her upcoming MIT List show, Yi will create a tableau revolving around a pond containing various manner of objects, and enveloped by the distinctive scent of mint. The work is part of Yi's ongoing "Flavor Genome" project. Yi will work in collaboration with movement arts pioneer and MIT alum Seth Riskin at the MIT Museum Studio to develop lighting elements for the piece. Yi's MIT LVAC exhibition opens May 22 and ends July 26.

Catalyst Conversations: Art and Science in Dialogue

MIT's LVAC also provides support for the art and science lecture series "Catalyst Conversations." Artist, educator, and curator Deborah Davidson sought a way to enable Boston-area artists to get more recognition for their talents and hard work. "I was noticing in a lot of gallery shows the tremendous interest in science and technology." This was the impetus for Davidson to start a series of public talks so people could get to know the artists and their work as well as learn about the science that inspires the work. Davidson's thoughtfully curated monthly lecture series is designed to educate and inspire. Catalyst Conversations has featured Alan Lightman, Felice Frankel, Janet Echelman, and Heather Dewey-Hagborg. After the featured scientist and artist presents their work, an organic open conversation with audience participants creates a space that truly puts art and science in dialogue. Davidson observes, since launching Catalyst Conversations in 2012, "As I've been doing this, I am seeing both worlds opening up to each other."

It appears the sciart bases are covered in Boston this spring. The co-mingling of art, science, and technology spark inspiration and increase the public understanding of cutting-edge research, bringing the future ever closer. One can only imagine what may ignite at the next Arts at MIT, MIT LVAC, Catalyst Conversations, Museum of Science, or Le Laboratoire event. Who's ready to sidle up to the bar at Café Art-Science and partake in a bit of empirical study?

Alberta Chu (Twitter @ASKlabsAlberta) is a content creator exploring the intersections of science and art at ASKlabs (www.asklabs.com). Chu will speak at Catalyst Conversations at MIT in April to introduce a new global citizen science project to build a taxonomy of faces. Tune in April 27th at 7pm EST: #CCfaces, @ Facetopo.