2016/17
Annual Report

Center for
Science and the
Imagination

Arizona State
University

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The Center for Science and the Imagination is approaching its fifth anniversary this fall. I am still delighted and amazed by the new projects, ideas, and conversations that bubble up, and even more so by our milestones and accomplishments. And in that regard, this past year has been exceptional. This spring the MIT Press published *Frankenstein: Annotated for Scientists, Engineers, and Creators of All Kinds* (co-edited by David H. Guston, Jason Scott Robert, and myself) as well as my new book *What Algorithms Want: Imagination in the Age of Computing*. In September 2016 we also released *Everything Change*, a collection of the winning stories from our Climate Futures writing contest with contributions from celebrated authors Kim Stanley Robinson and Paolo Bacigalupi. Each of these volumes was a tremendous team effort in different ways, and we are delighted to share them with the world.

Our programming and public engagement have brought our ideas to new audiences and enabled exciting connections. In November 2016 we hosted a 15th anniversary gathering of the filmmakers, designers, and futurists who helped create *Minority Report*, welcoming participants like Walter Parkes, the legendary producer, and Alex McDowell, who is now the production designer for *Star Wars: Episode IX*. As part of the Imagination and Climate Futures Initiative, we welcomed Elizabeth Kolbert and Amitav Ghosh to campus, and Emerge 2017 featured 15 different experiential art installations exploring the future of *Frankenstein*. These major events were complemented by our regular and ever-popular Science Fiction TV Dinners, as well as a new film series titled Unexpected Frankensteins.

We are also advancing on all fronts for our Frankenstein Bicentennial Project. We are continuing to develop a contemporary Frankenstein narrative aiming to engage young people in contemporary science-in-society issues. This summer we are finalizing the design of 51 activity kits that will be deployed to museums and science centers across the country, as well as finalizing the details of an alternate reality game that will debut in January 2018. In conjunction with our new *Frankenstein* edition, we learned in June 2017 that the Sloan Foundation will support the creation

of a free, open-access digital edition of the book that adds new annotations, rich media, and collaborative features. The many facets of the Frankenstein Bicentennial Project exemplify the transdisciplinary research approaches we are pioneering, and you will see Frankenstein projects in each thematic section of this report.

The center has been growing not just in publications and public impact but also in good old square feet. In December 2016 we moved into beautiful new offices on the first floor of the Centerpoint Building with floor-to-ceiling windows, flexible workspaces, and even a small library nook. Perhaps most exciting is the Digital Culture Incubator space we share with the School of Arts, Media and Engineering, where we hope to begin advancing student and faculty projects destined for life beyond the university.

The five-year milestone also provides an opportunity to reflect on the broader mission and goals of the center. This project launched with a five-year plan, and I'm pleased to say we have achieved our core objectives. As we begin to contemplate the next five years, we will be planning a series of conversations and events exploring our future. One goal of these events will be to better understand the imagination as a vital, cross-cutting idea and a fundamental human capacity, a precursor faculty that humans need to creatively respond to the challenges we face.

As we forge new connections, conduct groundbreaking intersectional research, and engage public audiences, we also continue to learn from our colleagues and collaborators. If you see something in these pages that sparks an idea or a question, please get in touch.

To the future!

Ed Finn
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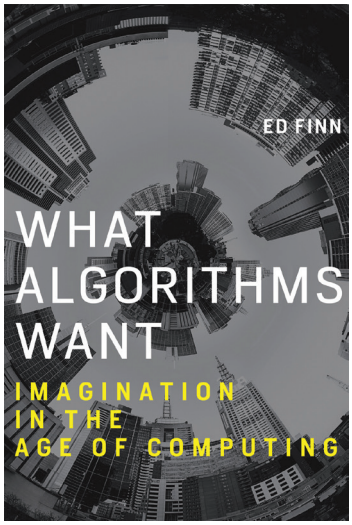
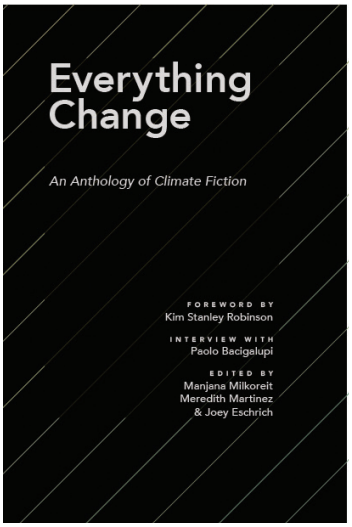
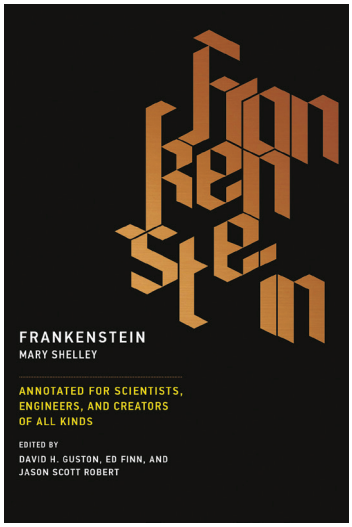
CSI Publications 2016-17







Books

Finn, E. (2017) *What Algorithms Want: Imagination in the Age of Computing.* Cambridge, MA: The MIT Press.

Milkoreit, M., Martinez, M., & Eschrich, J. (2016) *Everything Change: An Anthology of Climate Fiction.* Tempe, AZ: Arizona State University.

Shelley, M. W. *Frankenstein: Annotated for Scientists, Engineers, and Creators of All Kinds* (2017). Ed. D. H. Guston, E. Finn & J.S. Robert (Eds.). Cambridge, MA: The MIT Press.

Scholarly Publications

Nagy, P., Wylie, R., Eschrich, J., & Finn, E. (2017). Why Frankenstein is a Stigma Among Scientists. *Science and Engineering Ethics*, 1-17.

Neff, G., and Nagy, P. (2016). Talking to Bots: Symbiotic Agency and the Case of Tay. *International Journal of Communication*, *10*, 4915-4931.

Walker, E., Wylie, R., Danielescu, A., Rodriguez III, J. P., & Finn, E. (2017). Balancing Student Needs and Learning Theory in a Social Interactive Postdigital Textbook. In End-User Considerations in Educational Technology Design (pp. 141-159). IGI Global.

Wang, S., Walker, E., & Wylie, R. (2017). What Matters in Concept Mapping? Maps Learners Create or How They Create Them. In *International Conference on Artificial Intelligence in Education*, 406-417. **Nominated for Best Paper.**

Posters, Presentations, and Exhibits

Bacigalupi, P., Bell, M., Eschrich, J., & Percy, B. (2017, February). Where Do We Go from Here? After the Apocalypse. Panel discussion at the Desert Nights, Rising Stars annual conference.

Bates, J., Pataranutaporn, P., McCollum, K., Polur, R., & Lee, B. (2016, May). The Future of Innovation: Transforming Our Society for Saving Lives. Paper delivered at the Humanities, Arts, Science, and Technology Alliance and Collaboratory annual conference.

Beard, B. Miller, A. & Zarka, E. (2016, September) Frankenstein at 200. Presentation at Phoenix Comicon's Keen Halloween.

Beard, B. & Nagy, P. (2017, June). The Frankenstein Bicentennial Project: Science Fiction as a Lens for Examining Science and Society Issues. Presentation at the Special Libraries Association annual conference.

Bennett, M. (2016, July). Centrotrypt Adversus Haereses. Art exhibit at the National Academy of Sciences' DASER.

Bennett, M. (2016, December). Law and the Future of the American Public Library. Keynote at the Phoenix Public Library's Annual Staff Development Program.

Bennett, M. (2017, March). Governing Dark Futures. Presentation at the University of Tennessee-Knoxville's Futures of Afrofuturism symposium.

Bennett, M. (2017, May). Why Lawyers Need to Forget Science Fiction. Plenary at the American Bar Association's Joint Spring Meeting.

Finn, E. (2016, November). Making the Future—Foresight Thinking to Motivate and Innovate. Plenary panel presentation at the Alliance for the Arts in Research Universities annual conference.

Finn, E. (2017, January) Illusions of Progress: Visualization and the Politics of Stylized Time. Paper delivered at the Modern Language Association annual conference.

Finn, E. (2017, May). What Algorithms Want. Mini-plenary delivered at the National Center for Women and Information Technology's Summit on Women in Information Technology.

Finn, E., Gano, S., Guston, D.H., Lande, M., Nagy, P., Ostman, R., Simeone, M., & Wylie, R. (2017, January). Transmedia Museum: Increasing Learning and Efficacy about Emerging Technologies through Transmedia Engagement by the Public in Science-in-Society Activities. Poster presented at the ASU Learning Innovation Showcase.

Mawasi, A. & Zidani, S. (2017, June). Human Computer Interaction in the Arab World: Challenges and Opportunities. Position paper delivered at the Designing for the Arab World workshop.

Mihaleva, G., Pataranutaporn, P., & Ingalls, T. (2016, September). Wearable Installation and Human Interaction—"Generative Membrane." Presentation at 3D-Symposium BEYOND.

Mihaleva, G., Pataranutaporn, P., & Ingalls, T. (2017, June). Generative Membrane. Paper delivered at the International Symposium on Electronic Art annual conference.

Pataranutaporn, P. (2016). Futuretopia. Exhibition at i.d.e.a. Museum.

Pataranutaporn, P. (2016, September). Oral Ignite! Presentation at Stanford Medicine X event.

Pataranutaporn, P. (2017, March). Prototyping the Impossible. TEDxASU.

Posters, Presentations, and Exhibits (Continued)

Pataranutaporn, P., Lester, N., McCollum, K., Burnam-Fink, M., Sarabu, C., & Gandhi, N. (2016, November). Hacks for Humanity. Panel discussion at Disruptive Innovation Festival.

Pataranutaporn, P., Mihaleva, G., Surareungchai, W., Ingegno, M., & Loha-Unchit, S. (2016, November). Innovation in the Age of Biodesign. Panel discussion at Disruptive Innovation Festival.

Pataranutaporn, P., Tantisanghirun, R., Kuptajit, P., Kulsupakarn, T., & Raphael, A. (2016, October). Jube. Presentation at the Biomimicry Global Design Challenge Pitch Event and Technology Showcase.

Pataranutaporn, P., Valencia, A. V., & Kusumi, K. (2016, May). Visualizing Biodesign: Transforming Research through Interactive Technology. Paper delivered at the Humanities, Arts, Science, and Technology Alliance and Collaboratory annual conference.

Pataranutaporn, P., Wongkaew, C., Surareungchai, W., & Kirtikara, K. (2016, February). A Method for Identifying STEM Gifted and Talented Youth: Development of Mentoring Approaches. Paper presented at the 7th Thailand-U.S. Education Roundtable STEM Education: Learning Culture of the 21st Century Workforce.

Suwinyattichaiporn, T., & Pataranutaporn, P. (2016, February). When Interactive Animation and Communication Research Converge: An Innovative Presentation and Gamification of Research Findings. Presentation at the Western States Communication Association annual conference.

Suwinyattichaiporn, T., & Pataranutaporn, P. (2017, February). Centralizing Marginality: Teaching Race Issues through the Use of Virtual Reality. Paper delivered at the Western States Communication Association annual conference.

Walker, E., Wylie, R., Wang, S., Dalal, M., & Finn, E. (2017, January). Towards Knowledge Curation and Community Building in the Postdigital Textbook. Poster presented at the ASU Learning Innovation Showcase.

Wylie, R., Walker, E, & Finn E. (2017, April). Postdigital Textbook: Design Process and Demonstration. Poster presented at the Cyberlearning 2017 conference.

Yoo, S. (2016, October). Multi-Person Interaction: Enhancing Practices for Interactive Group Participation. In *Proceedings of the 2016 Annual Symposium on Computer-Human Interaction in Play Companion Extended Abstracts*, 21-24.

Yoo, S., & Iyengar, V. (2017, May). Banana Kiss: A Participatory Interactive Installation to Enhance Intimacy with Kiss Interaction. In *Proceedings of the 2017 CHI Conference Extended Abstracts on Human Factors in Computing Systems,* 1405-1408.

Yoo, S., Lakshminarayana, C., & Basu, A. (2017, March). Nellodee 1.0: A Living Book to Enhance Intimacy with Head Gestures and Kinetic Typography. In *Proceedings of the Tenth International Conference on Tangible, Embedded, and Embodied Interaction*, 517-520.

Yoo, S., & Seshasayee, S. (2016, October). MocaBit 2.0: A Gamified System to Examine Behavioral Patterns through Granger Causality. In *Proceedings of the 2016 Symposium on Spatial User Interaction*, 207.

Popular Media

Beard, B. (2016, September 9). It's Alive! Frankenstein's Influence 200 Years Later. KJZZ 91.5 public radio. http://theshow.kjzz.org/content/362526/its-alive-frankensteins-influence-200-years-later

Beard, B. (2016, October 27) Frankenstein is Alive at ASU Libraries this Fall. Arizona Daily Mix, KAZT-TV.

Durisen, R., Eschrich, J., Kilgore, D. W., & McCauley, G. (2017, March 3). Sci-fi's Impact On Fact: Blurring The Line Of Fantasy And Reality. Indiana Public Radio. https://indianapublicmedia.org/noonedition/scifis-impact-fact-blurring-line-fantasy-reality

Eschrich, J. (2016, October 12). Climate Change Explored In New Collection Of Short Fiction. KJZZ 91.5 public radio. http://kjzz.org/content/380411/climate-change-explored-new-collection-short-fiction

Eschrich, J. (2016, October 21). "If You Still Don't Get How Global Warming Will Alter Everything, Read Some Climate Fiction." *Slate*. http://www.slate.com/blogs/future_tense/2016/10/21/climate_fiction_helps_explain_how_global_warming_will_alter_everything.html

Eschrich, J. (2016, October 27). Why "Frankenstein" Is a Great Science Policy Guide for the Future. *Zócalo Public Square*. http://www.zocalopublicsquare.org/2016/10/27/frankenstein-great-science-policy-guide-future/ideas/nexus

Eschrich, J. (2017, January 24). How Frankenstein's Monster Became Sexy. *Slate*. http://www.slate.com/articles/technology/future_tense/2017/01/why_frankenstein_adaptations_now_make_the_monster_sexy.html

Eschrich, J. & Beard, B. (2016, November 30). Author H. G. Wells' Influence Continues With Publication Of Short Story. KJZZ 91.5 public radio. http://kjzz.org/content/402166/author-hg-wells-influence-continues-publication-short-story

Finn, E. (2016, July 18). Power of Social Media: Erdogan's Smart Use of a Smartphone. *CNN Opinion*. http://www.cnn.com/2016/07/18/opinions/erdogan-face-time-social-media-ed-finn

Finn, E. (2017, March 21). The Corrupt Personalization of Netflix. *Slate*. http://www.slate.com/articles/technology/future_tense/2017/03/how_netflix_embodies_a_seductive_myth_of_the_algorithmic_age.html

Finn, E. (2017, April 10). Do Digital Currencies Spell the End of Capitalism? *The Guardian*. https://www.theguardian.com/science/political-science/2017/apr/10/do-digital-currencies-spell-the-end-of-capitalism

Finn, E. (2017, April 12). Can Coding the Brain Save or Destroy Us? *CNN Opinion*. http://www.cnn.com/2017/04/12/opinions/can-coding-the-brain-save-or-destroy-us-finn-opinion/index.html

Frankenstein200
Frankenstein at School
Evoke
The Exquisite Corpse Lab
Grand Challenges Engineering

Frankenstein: Annotated
Imagination and Climate Futures
What Algorithms Want
Future Tense
Science Comics Workshop
A Year Without a Winter
Stratosphere Narrative Hackathon
Mexican Space Collective
Colors of Space Exhibition

Minority Report
Frankenstein at 200 Exhibition
Science Fiction TV Dinners
Unexpected Frankensteins
Imaginary Friends Happy Hours
Imaginary Papers
Threatcasting Lab Workshop
Visitors and Visits

Emerge 2017: *Frankenstein*
Democracy as a Service
Emerge Gallery

Future of Learning

How can we use shared texts and collective myths to light the spark of imagination and create new opportunities for collaborative, creative learning?

Ruth Wylie works with students from Greenway Middle School in Phoenix, AZ on a science activity inspired by *Frankenstein.* *Courtesy: Scottsdale Arts*

Center for Science and Imagination

Frankenstein200

Mary Shelley's *Frankenstein* is a pervasive modern myth: an iconic 200-year-old science fiction story exploring human creativity, social responsibility, and scientific ethics. On the eve of the novel's bicentennial, these themes resonate more than ever.

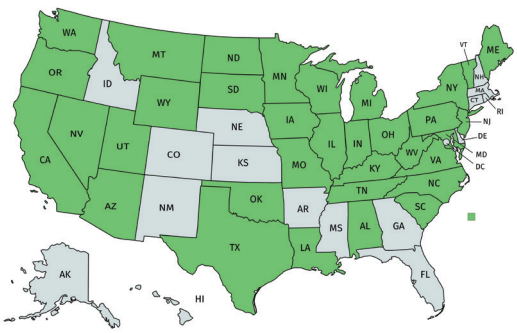
As citizens with access to incredible tools for creation and transformation, we need not only to understand the fundamentals of science and technology, but also to develop the skills to participate in the ethical and policy debates surrounding these fields. Arizona State University, with a grant from the National Science Foundation (Award #1516684), is taking on this challenge, using *Frankenstein* as a narrative frame to deepen public engagement and increase efficacy around issues of scientific creativity and responsibility.

The project, titled "Increasing Learning and Efficacy about Emerging Technologies through Transmedia Engagement by the Public in Science-in-Society Activities," will advance new approaches to the design and development of STEM learning in informal environments, using distinct but interconnected media across digital and physical spaces:

Frankenstein200 Alternate Reality Game: A digital narrative that combines interactive storytelling tools like videos, web pages, puzzles, and games with real-life objects and places to examine emerging technologies and reimagine Mary Shelley's *Frankenstein* for a new generation of students and their families.

Frankenstein200 Footlocker: A tabletop kit deployed to 51 museums and science centers across the nation to support creative and making activities, promote reflection on social and ethical issues, and explore emerging technologies like artificial intelligence, synthetic biology, robotics, and bioengineering.

Frankenstein200 Workbench: A set of at-home maker activities, online challenges, and competitions involving hands-on science and other creative activities.



Frankenstein200 Footlocker kits will be deployed in science centers and museums in 34 states across the U.S.

http://frankenstein.asu.edu

Across these multiple engagements, Frankenstein200 will prompt participants to consider three guiding questions that emerged in Shelley's original masterpiece and that persist in contemporary society:

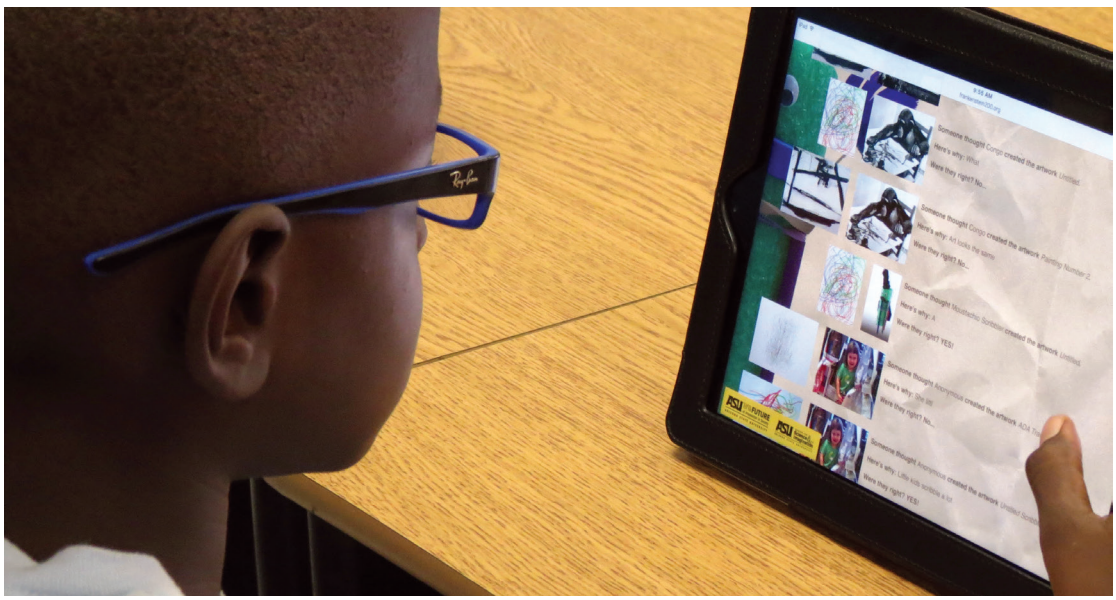
What is life?
What does it mean to be human?
Why do we create?

Frankenstein200 will launch in 2018 with the support and partnership of the following organizations:

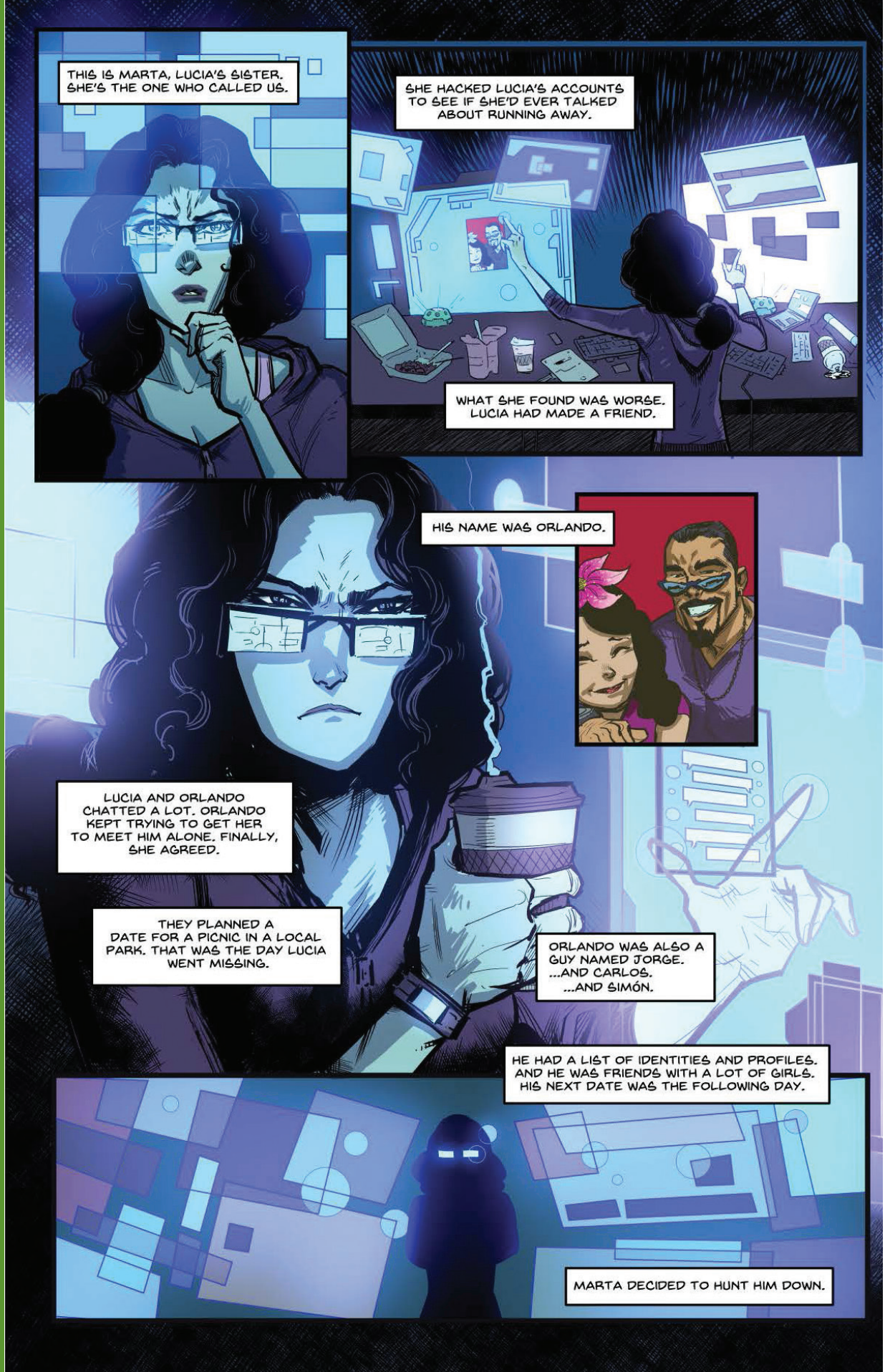
The Bakken Museum
The Rosenbach Museum and Library
Science Museum of Minnesota
No Mimes Media
Mesa i.d.e.a. Museum
Arizona Science Center
Children's Museum of Houston
Arizona SciTech Festival
Scottsdale Cultural Council
Arizona State Library System
Phoenix Comicon
Frankenreads

Frankenstein at School

As part of our Frankenstein200 project, we conducted an exploratory study to test our hypothesis that students can develop higher science self-efficacy and more realistic perceptions of science by engaging in a combination of offline and online science activities. Based on an extensive literature review, we created and tested several measures targeting students' science self-efficacy beliefs, perceptions of science and scientists, and level of interest in science. Our samples consisted of 59 elementary school and 23 middle school students. The students took part in different offline and online activities that were expected to have a positive impact on their science self-efficacy and attitudes towards science and engineering. Using simple components, our participants created their own miniature robots, adorable or scary mutants, simple electronic circuits, and cardboard machines. They also took part in online arts activities in which they created various digital prototypes and artifacts, and then curated them for online exhibition and sharing. After creating these products, we asked the students to reflect on a wide range of questions related to art, science, and engineering. The results from this exploratory study helped us improve the activities and refine our measures in advance of the public launch of the Frankenstein200 project in 2018.



Students from Laguna Elementary School in Scottsdale, Arizona participate in digital and hands-on science activities as part of our Frankenstein200 research.
Courtesy: Scottsdale Arts


THIS IS MARTA, LUCIA'S SISTER. SHE'S THE ONE WHO CALLED US.
SHE HACKED LUCIA'S ACCOUNTS TO SEE IF SHE'D EVER TALKED ABOUT RUNNING AWAY.
WHAT SHE FOUND WAS WORSE. LUCIA HAD MADE A FRIEND.
HIS NAME WAS ORLANDO.
LUCIA AND ORLANDO CHATTED A LOT. ORLANDO KEPT TRYING TO GET HER TO MEET HIM ALONE. FINALLY, SHE AGREED.
THEY PLANNED A DATE FOR A PICNIC IN A LOCAL PARK. THAT WAS THE DAY LUCIA WENT MISSING.
ORLANDO WAS ALSO A GUY NAMED JORGE. ...AND CARLOS. ...AND SIMÓN.
HE HAD A LIST OF IDENTITIES AND PROFILES. AND HE WAS FRIENDS WITH A LOT OF GIRLS. HIS NEXT DATE WAS THE FOLLOWING DAY.
MARTA DECIDED TO HUNT HIM DOWN.

Evoke

We continue to collaborate with the World Bank to develop educational narratives that help young people in developing nations acquire 21st century skills and that raise awareness of global grand challenges. Beginning at a Narrative Hackathon workshop in 2014, interdisciplinary teams drafted comic book–style narratives focused on one of six global grand challenges (including universal literacy, human trafficking, and wildlife conservation). During the past year, we finalized two of these stories, and the latest iteration of Evoke was played as part of a Social Responsibility course at a university in Soacha, Colombia. Students in the course participated in a 16-week experience that combined online and real-world experiences, using the human trafficking narrative that originated at the hackathon.

Preliminary results from the study showed that compared to a control condition, students who participated in Evoke demonstrated statistically significant greater learning outcomes in 21st century and socio-emotional skills. We are currently planning another narrative hackathon to be held at ASU's California Center.

Page from the Evoke comic book on human trafficking, written by Madeline Ashby and drawn by Anthony Diecidue.

Grand Challenges Engineering

ASU's Fulton Grand Challenge Scholars program, part of an initiative from the National Academy of Engineering, combines innovative curriculum and cutting-edge research experiences to prepare engineering students to solve the grand challenges facing society. CSI runs an in-class science fiction prototyping exercise for first-year Grand Challenge students in both the fall and spring semesters, helping students to grapple with the social, cultural, and psychological implications of their applied technology projects by creating their own future narratives. We also present a lecture and activity in the annual Grand Challenge summer program, where we investigate the feedback loop between science fiction and real-world scientific discovery and technological innovation and introduce several creative tools for brainstorming and low-fidelity prototyping.

Courtesy: Jessica Hochreiter for Ira A. Fulton Schools of Engineering

https://gcsp.engineering.asu.edu

Courtesy: Madison Arnold for The State Press

The Exquisite Corpse Lab

Students in Ed Finn's fall 2016 course Prototyping Dreams spent the middle of the semester on an unusual assignment: a massive collective art installation in Hayden Library on ASU's Tempe campus. Their challenge? Create a modern-day Victor Frankenstein's laboratory, if Victor was an at-risk undergraduate student at ASU. Over the course of five weeks, teams of 8-10 students each had 24 hours in the room to make their contribution to this "exquisite corpse"—an art piece where each successive group modified or extended the work of previous teams.

During the experiment, the installation space—located in one of the library's busiest study areas—moved through an entire *Frankenstein* narrative arc, culminating in the animation of a creature on a large operating table, and then a catastrophic aftermath. The creature remains at large.

Science & Imagination

How can we harness imagination as a resource for confronting our biggest problems? How can we tell new stories that inspire hope, agency, and ambition?

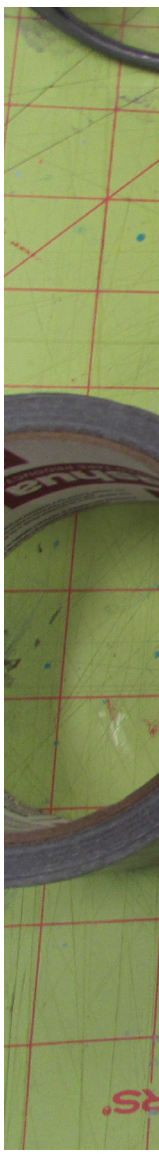
A view from Arcosanti, Paolo Soleri's utopian desert community--the site of our Year Without a Winter workshop.
Courtesy: Brenda Cooper

Center for Science and Imagination

Frankenstein: Annotated

CSI hit a major milestone in May 2017 with the publication of *Frankenstein: Annotated for Scientists, Engineers, and Creators of All Kinds.* This new scholarly edition of Shelley's classic novel was edited by David H. Guston, Ed Finn, and Jason Scott Robert, with Joey Eschrich and Mary Drago serving as managing editors. This edition pairs the original 1818 version of the manuscript—meticulously line-edited and amended by Charles E. Robinson, one of the world's preeminent authorities on the text—with annotations and essays by leading scholars and science fiction authors exploring the social and ethical aspects of scientific creativity raised by this remarkable story. The book contains over 100 annotations contextualizing the novel in relation to emerging technologies, ethics, and the history of science, all reflecting on the fundamental question of scientific creativity and responsibility.

Timed to anticipate the bicentennial of the novel's original publication in January 1818, the book has already received positive coverage, including pieces in *Times Higher Education, New Scientist, IEEE Spectrum, The Boston Globe*, and *Engineering & Technology.* We celebrated the book with a half-day Future Tense event in Washington, D.C., "The Spawn of Frankenstein," as well as a book launch at the art-science research center Le Laboratoire in Cambridge, organized by the MIT Press. At these events we brought together synthetic biologists, literary historians, science fiction writers, and others to contemplate the lessons of the Frankenstein myth and its value for navigating the complex social and ethical challenges of emerging fields like synthetic biology, artificial intelligence, and robotics.



http://imgn.how/frankbook


FRANKENSTEIN
MARY SHELLEY
ANNOTATED FOR SCIENTISTS, ENGINEERS, AND CREATORS OF ALL KINDS
EDITED BY
DAVID H. GUSTON, ED FINN, AND JASON SCOTT ROBERT

Imagination and Climate Futures

The Imagination and Climate Futures Initiative (ICF) explores how imagination shapes humanity's response to climate change, and how art and literature, merged with science, can create solutions to climate challenges. The initiative, a partnership of CSI and ASU's Virginia G. Piper Center for Creative Writing, hosts public events, offers occasional courses, and encompasses research projects uniting scholars and practitioners from a broad range of disciplines.

Everything Change

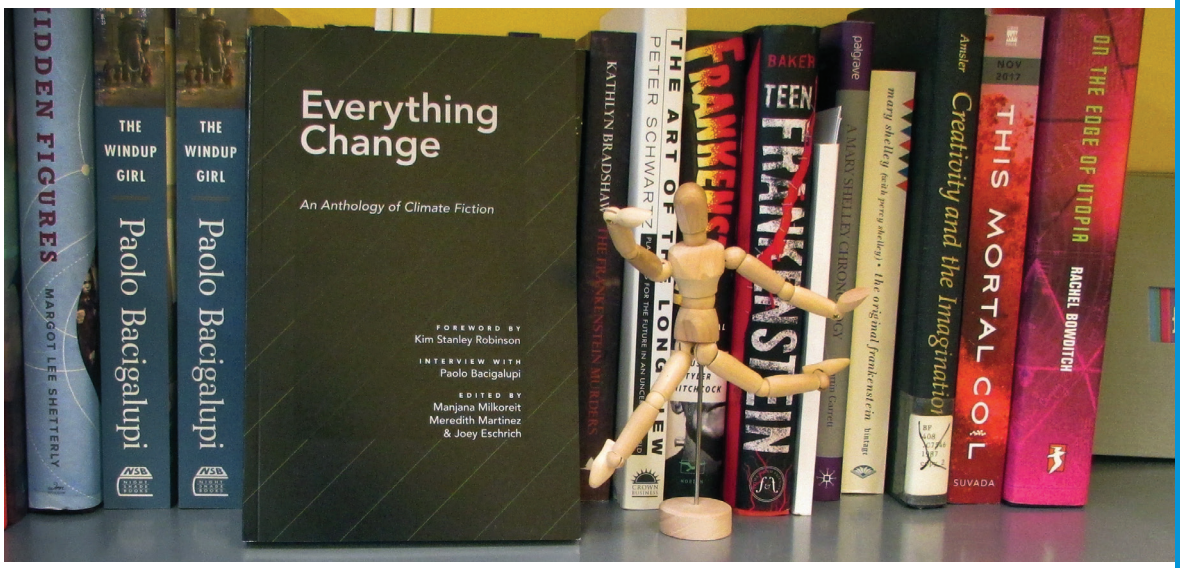
The challenge of climate change is that it's gradual—a pervasive, creeping calamity that can be difficult for people to accept or comprehend. But what if people could understand it better by escaping their everyday realities? Climate fiction stories have the power to turn policy debates and jargon into gripping tales that put climate change in human terms.

In 2015 and 2016, the ICF hosted our inaugural Climate Fiction Short Story Contest, inviting writers to envision futures for Earth and humanity transformed by climate change. The contest received over 740 entries from 67 countries.

In September 2016, we published *Everything Change*, an anthology that features 12 winning stories from the contest, along with a foreword by science fiction legend and lead contest judge Kim Stanley Robinson and an interview with renowned climate fiction author Paolo Bacigalupi. The collection is free to download, read, and share in a variety of formats from the ICF website as well as the Apple iBooks and Kobo digital bookstores.

The anthology includes the grand prize winner of the contest, "Sunshine State," a quasi-utopian disaster story set in the Florida Everglades, written by Adam Flynn and Andrew Dana Hudson of Oakland, California. Other stories explore disaster tourism, environmentally-motivated coups, the human toll of catastrophic flooding and crop failures, invasive species and extinctions, surging wildfires, and more.

https://climateimagination.asu.edu



Annual Lecture

Over the last half-billion years, there have been five mass extinctions. Scientists around the world are currently monitoring a sixth, predicted to be the most devastating extinction event since the cataclysm that wiped out the dinosaurs—the fifth extinction, over 65 million years ago. This time around, the cataclysm is us.

Our third annual Imagination and Climate Futures lecture was delivered on October 20, 2016 by Pulitzer Prize–winning author and journalist Elizabeth Kolbert, author of *The Sixth Extinction: An Unnatural History* as well as the prescient 2006 book *Field Notes from a Catastrophe: Man, Nature, and Climate Change*. In her lecture, Kolbert discussed how human beings have altered life on the planet in an unprecedented way, and how the sixth extinction is likely to be our most lasting legacy. Weaving natural history, scientific analysis, and reporting from the field into a richly detailed narrative, Kolbert took an ecological crisis that often seems abstract and made it viscerally real.

During her visit to ASU, Kolbert led a workshop for faculty and students about the art of effectively communicating with the public about science and the role that narrative, whether fictional or nonfictional, plays in that endeavor. Kolbert also sat down with CSI's Joey Eschrich for an interview to explore the finer points of her reporting and storytelling craft. The conversation ranged from the language that writers use to describe esoteric scientific research to the role of humor in public communication about climate change.

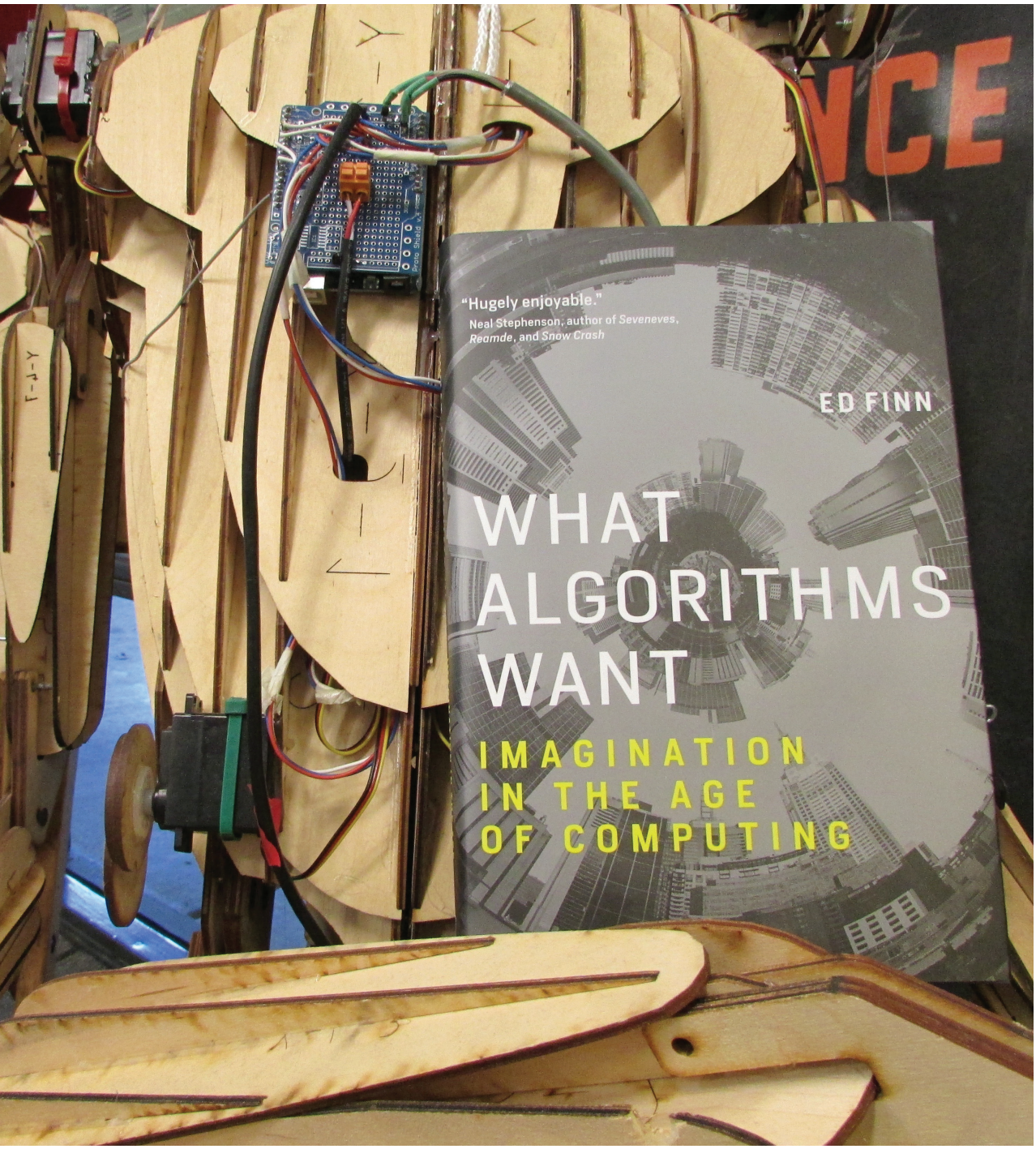
Previous lecturers in the Imagination and Climate Futures series are Paolo Bacigalupi and legendary author, activist, and critic Margaret Atwood. Kim Stanley Robinson, author of visionary science fiction novels including *Aurora*, the Mars Trilogy, and *New York 2140*, will deliver the fourth lecture in fall 2017.

What Algorithms Want

Ed Finn's monograph *What Algorithms Want: Imagination in the Age of Computing* was published in March 2017 by the MIT Press. In this book, Ed considers how the algorithm—in practical terms, "a method for solving a problem"—has its roots not only in mathematical logic but also in cybernetics, philosophy, and magical thinking. We depend on—we believe in—algorithms to help us get a ride, choose which book to buy, or execute a mathematical proof. Drawing on sources that range from Neal Stephenson's *Snow Crash* to Diderot's *Encyclopédie*, from Adam Smith to the *Star Trek* computer, Ed explores the gap between theoretical ideas and pragmatic instructions. Along the way, he examines the development of intelligent assistants like Siri, the rise of algorithmic aesthetics at Netflix, Ian Bogost's satiric Facebook game *Cow Clicker*, and the revolutionary economics of Bitcoin. He closes the book with a chapter on algorithmic imagination and the prospects for true collaboration between human and machine.

The book has garnered positive reviews from outlets including the *Los Angeles Review of Books*, the *Boston Review*, and the journal *Technoculture*. Ed also excerpted a portion of the book on *Slate*'s Future Tense channel and wrote articles on algorithms in the news for *The Guardian, CNN Opinion*, and *Issues in Science and Technology.* In March 2017, Ed spoke about the book at a Future Tense event in Washington, D.C., and at an *Issues in Science and Technology* gathering at ASU's D.C. office.

http://imgn.how/algorithms


"Hugely enjoyable."
Neal Stephenson, author of Seveneves, Reamde, and Snow Crash
ED FINN
WHAT ALGORITHMS WANT
IMAGINATION IN THE AGE OF COMPUTING

Future Tense

Future Tense is the citizen's guide to the future.

A partnership of *Slate*, New America, and Arizona State University, Future Tense explores how emerging technologies will change the way we live. The latest consumer gadgets are intriguing, but we focus on the longer-term transformative power of robotics, information and communication technologies, synthetic biology, augmented reality, space exploration, and more.

Future Tense seeks to understand the latest breakthroughs and what they mean for our environment, how we relate to one another, and what it means to be human. We also examine whether technology can be governed democratically and ethically. We ask these questions in commentary published on *Slate* and through public events in Washington, D.C., New York, and other major cities in the U.S. and beyond, featuring conversations with leading scientists, technologists, policymakers, and journalists.

CSI acts as a hub for Future Tense at ASU, working to involve more faculty, staff, and students in the partnership and exploring h ow to connect Future Tense more deeply to the university's research, teaching, and outreach efforts.

Illustration for Emily St. John Mandel's Future Tense Fiction story "Mr. Thursday," by *Slate*'s Lisa Larson-Walker.

Future Tense Fiction

In 2016, we launched Future Tense Fiction, a regular series featuring original science fiction stories by well-known authors. Each story is accompanied by original visual art and a response essay from a researcher or technical expert.

The first Future Tense Fiction story was written by climate fiction author Paolo Bacigalupi. The second entry in the series, published in March 2017, is "Mr. Thursday," a ruminative story about time travel, fate, unrequited longing, and public transportation. The story was written by Emily St. John Mandel, author of the acclaimed post-apocalyptic novel *Station Eleven* and winner of the Arthur C. Clarke Award and the Toronto Book Award. The response essay—written by ASU theoretical physicist Paul Davies, author of *How to Build a Time Machine*—illuminates the science of parallel realities, quantum mechanics, causal loop paradoxes, and relativity.

The Spawn of Frankenstein

On February 2, 2017 in Washington, D.C., Future Tense hosted "The Spawn of Frankenstein," an event where science fiction authors, bioethicists, artificial intelligence engineers, scholars of literature and history, television writers, and journalists considered two major questions: Why are we still talking about *Frankenstein*, 199 years later? And what do we still have to learn from Victor Frankenstein and his creature, at a time when our scientific and technological capabilities make the novel's premise of creating life in the lab more plausible than ever?

The event followed a January 2017 editorial package of the same title on *Slate*'s Future Tense channel. The package features articles on modern-day biohacking; the need for open, transparent science; echoes of Victor and the creature in recent film and pop culture, from *Ex Machina* to *Westworld*; what artificial intelligence researchers can learn from Victor's mistakes; ethical debates around animal vivisection in the 19th century; connections between *Frankenstein* and the anti-vaccine movement; and the evolving linguistic dynamics of the prefix *Franken-*, which has taken on a life of its own.

https://slate.com/futuretense

Science Comics Workshop

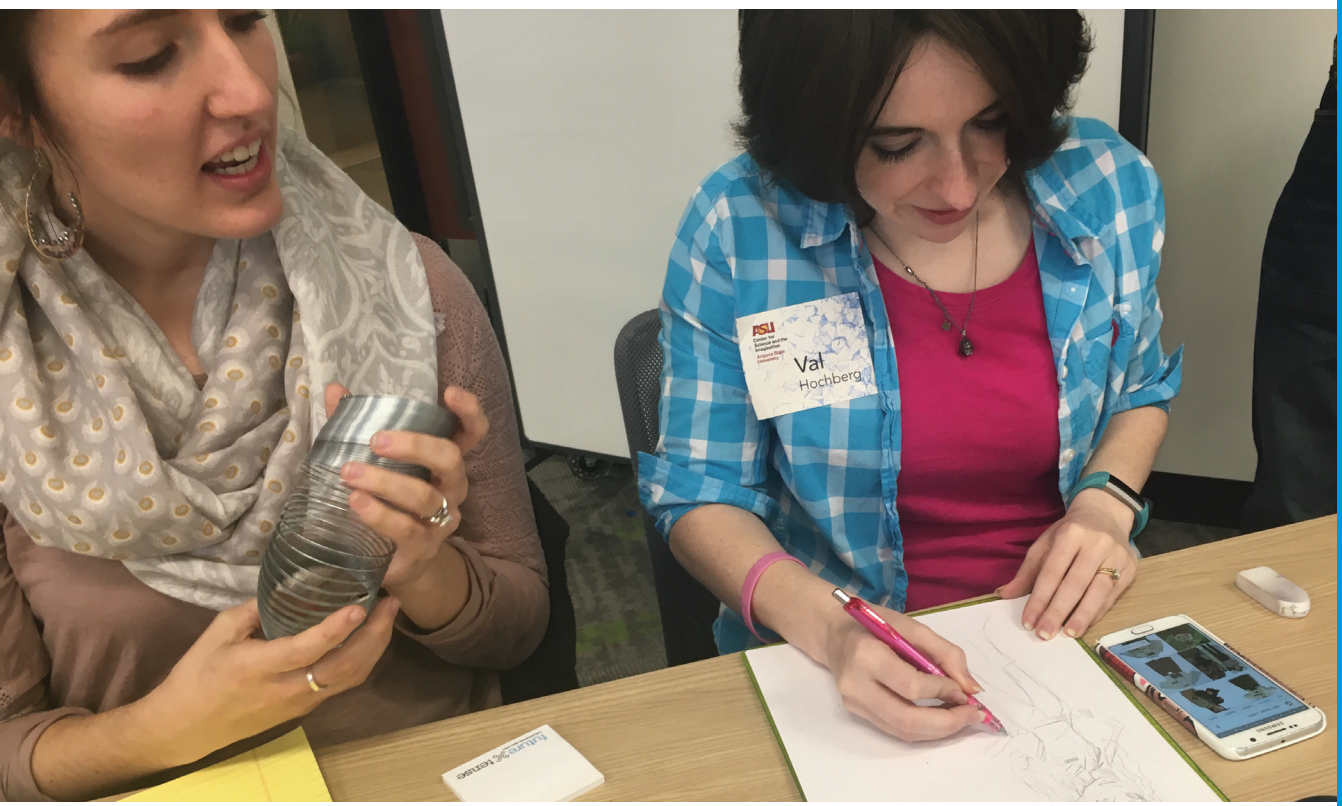
In an increasingly networked and visual culture, comic books and graphic novels are becoming important tools for bolstering literacy and communicating with diverse audiences.

Inspired by the potential of this rapidly expanding medium, CSI convened a group of comics professionals, led by Mark Siegel, *New York Times* bestselling author and editorial director of the graphic novel imprint First Second Books, to participate in a narrative experiment and teach us more about this growing art form.

On February 16, 2017, Mark presented a public lecture, "The Great American Graphic Novel," which covered the history of comics and graphic novels, the creative process behind them, and their unique contribution to the art of storytelling.

The next day, Mark facilitated a science communication workshop that paired comic book artists with ASU scholars to create original visual narratives based on their research. The teams created stories about biomimicry, desert ecosystem conservation, and swarms of sentient satellites, featuring illustrations by award-winning artists from DC Comics and Lucasfilm. These mini-comics explored playful ways to communicate about complex topics and laid the groundwork for more adventures with graphic storytelling in the future.

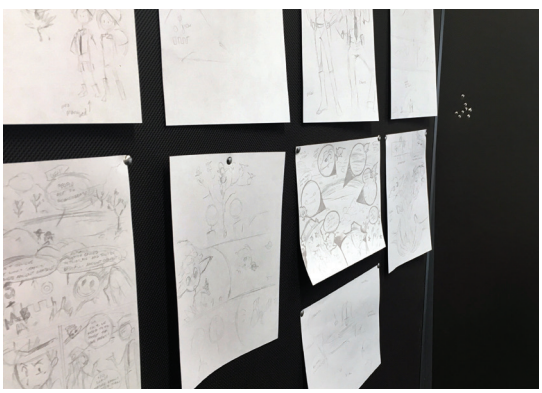
Science and Imagination



Michelle Sullivan *(left)* and Val Hochberg *(right)* collaborate on a mini-comic about desert ecosystem conservation, based on Michelle's research.

Scholars
Adelheid Fischer, assistant director, Biomimicry Center
Michelle Sullivan, Ph.D. candidate, School of Life Sciences
Jekan Thanga, assistant professor, School of Earth and Space Exploration

Artists
Spencer Brinkerhoff III
Val Hochberg
Brian Miller



Members of the Year Without a Winter team learn about the history of Arcosanti from a tour guide and resident. *Courtesy: Brenda Cooper*

A Year Without a Winter

A Year Without a Winter takes its inspiration from the genesis of Mary Shelley's *Frankenstein*, which was conceived on a dare in 1816 on the shores of Lake Geneva during the "Year Without a Summer." That year, the volcanic eruption of Mount Tambora in Indonesia led to extreme weather, harvest failures, and famine worldwide.

We recreated that dare at ASU on October 28 and 29, 2016, inviting four professional science fiction authors to participate in a workshop with experts in climate change, environmental science, literature, and history. As part of the workshop, authors spent a night at Arcosanti, visionary architect Paolo Soleri's utopian desert community, and a day consulting with experts and brainstorming at ASU in Tempe.

Coming out of the workshop, our authors will write novelettes set in A Year Without a Winter: a specter of a climate-changed future where winter falls away completely. Each story will feature a compelling narrative set against the backdrop of a human future shaped by climate change and our responses to it. The stories will be collected in a book published by Columbia University Press, alongside scholarly essays and visual art exploring the complex relationship between humans and our changing planet.

Fiction authors for the project include Tobias Buckell, Nancy Kress, Nnedi Okorafor, and Vandana Singh. The *Year Without a Winter* book will be co-edited by CSI's Joey Eschrich, CSI Imaginary College Fellows Brenda Cooper and Dehlia Hannah, and Cynthia Selin of ASU's School for the Future of Innovation in Society.

Stratosphere Narrative Hackathon

Designer Michael Duah works on an illustration at the Stratosphere Narrative Hackathon.

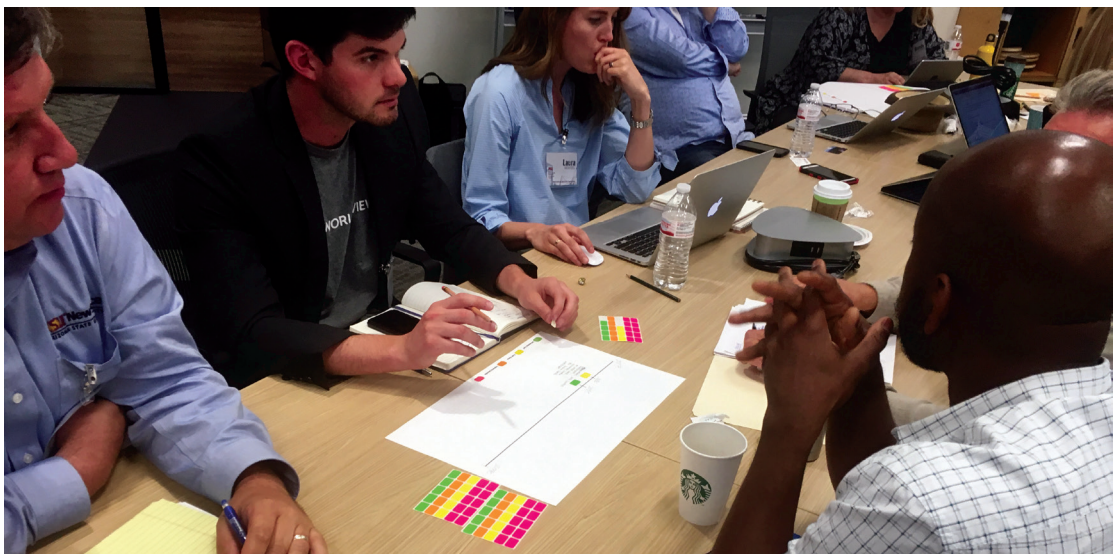
In May 2017, we hosted a Narrative Hackathon workshop that brought together acclaimed science fiction authors, visual artists, experts in fields ranging from human spaceflight to signal processing, and public communications professionals to create technically grounded, inspiring visions for the future of human activity in the stratosphere. Participants were divided into four teams, each focused on different aspects of stratosphere activity: communications and disaster response, science and weather observation, tourism, and Earth observation.

The Science and Weather Observation team collaborates on their future timeline at the Stratosphere Narrative Hackathon workshop.

Science and Imagination

Each team produced a short story set in the near future, a work of visual art that represents a key moment or theme from the story, and a timeline denoting speculative technological and societal milestones unfolding between our present and the time of the story's imagined future. Teams oscillated between small-group brainstorming, large group presentations, cross-group feedback, revisions and refinement, and individual working time throughout the one-day event. In the wake of the event, the teams continued their conversations and worked with editors to sharpen and finalize their work. The stories, visual art, and timelines will be published in fall 2017 in a free digital anthology, *Overview: Stories in the Stratosphere.*

Our goals for this project are to establish the stratosphere as an arena for public imagination, and to encourage people—both inside the aerospace industry and beyond—to think critically and creatively about how humans might engage with near space in the future. We believe that gripping stories guided by expertise and grounded in real-world science and technology have the potential to shape the future culture, governance, and economy of the stratosphere.



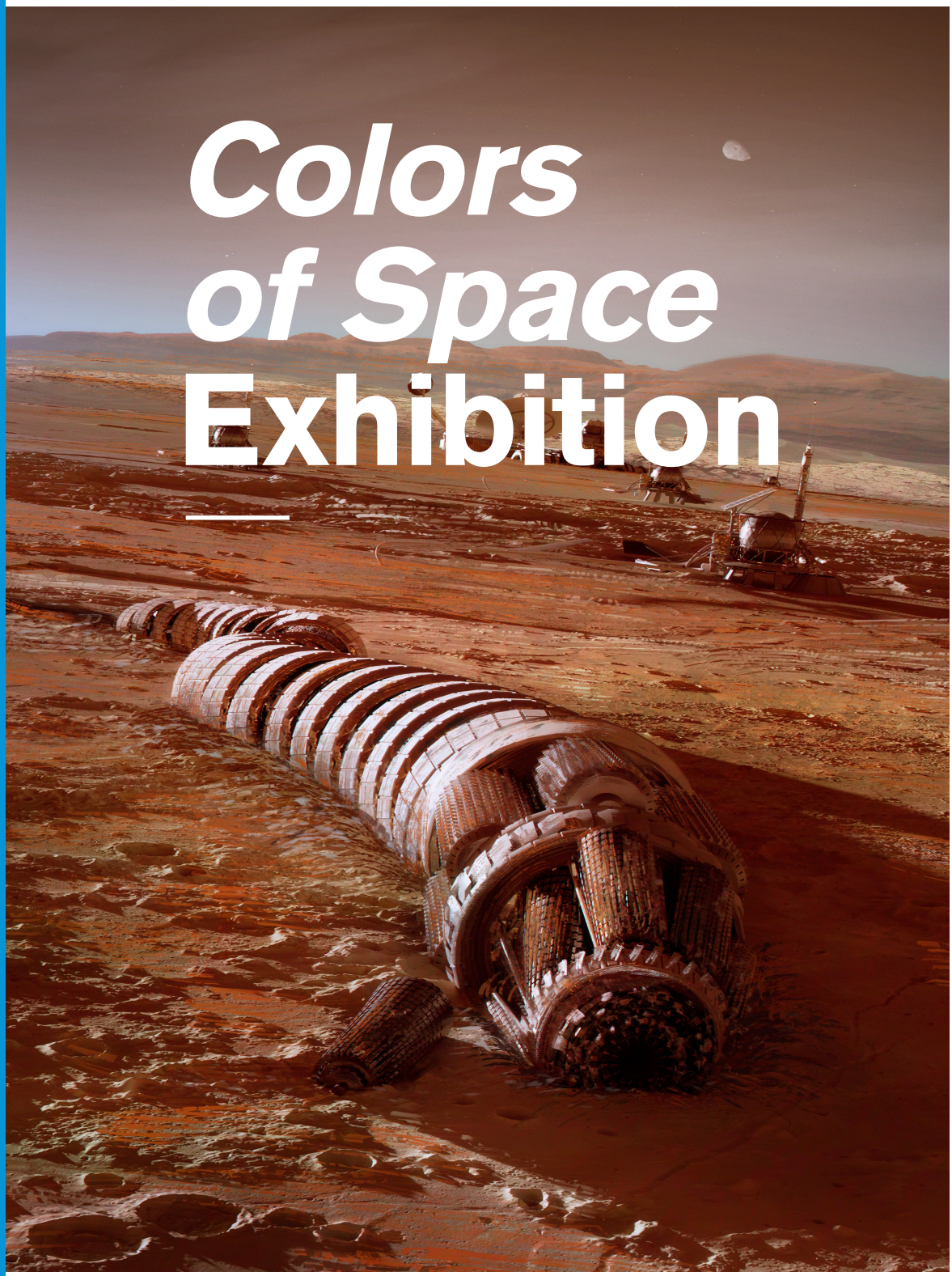
Mexican Space Collective

Science and Imagination

Juan José Díaz Infante has been collaborating with CSI's Ed Finn for several years on documenting his ambitious creative project, Ulises. In 2010, Juan founded the Mexican Space Collective and initiated his plans for Ulises, a series of satellites designed as artworks to be launched into space. Inspired in equal parts by Sputnik and the history of 20th century space exploration, on the one hand, and the ongoing tragedy of Mexico's endemic drug-fueled violence and political challenges on the other, Ulises seeks to make a kind of poetry out of doing the impossible. The project predated the existence of the official Mexican governmental space agency, and the story of Juan's adventures and challenges in moving Ulises forward became a project of its own.

That history has now been documented in a book Juan published in April 2017, a *diario de viaje* that includes an essay by Ed Finn alongside contributions from several artists who worked with the collective. We celebrated the launch of the book by inviting Juan to speak at a workshop on narrative space futures held at CSI that same month. In the coming year, the center will work with Juan to create an English translation of the book and continue to share this inspiring story of space as a canvas for artistic imagination and exploration.

Sketches of the Ulises I satellite, from the book *Ulises I, una mission de arte al espacio por el Colectivo Espacial Mexicano.*



Colors of Space Exhibition

Art by Maciej Rebisz

Science and Imagination

Art has always been an important part of space exploration. Scientists and engineers rely on artists to depict their greatest plans and discoveries, and art inspires scientists and engineers to push the limits of technology to the edge of possibility. During a workshop on the near future of human space exploration in April 2017, we hosted Maciej Rebisz, a concept artist and illustrator from Poland. Maciej helped the workshop's science fiction authors, engineers, historians, and sociologists imagine a variety of possible human space futures, from Low Earth Orbit to far-flung exoplanets. His work was also featured for several weeks in a public exhibition, *Colors of Space*, at ASU's School of Earth and Space Exploration in Tempe.

Maciej is an ideal collaborator for CSI because his art reflects both his technical training as an architectural engineer and his lifelong enthusiasm for space. His images portray space missions unfolding in alternative pasts and potential futures, ranging from the fantastically speculative to the meticulously researched and technically grounded. He has created art for *National Geographic*, NASA, the European Space Agency, and private space corporations. He is currently contributing to a space futures project that draws on the research and expertise of faculty from the School of Earth and Space Exploration; it will debut in late 2017.

"In the brief time that humanity has been launching vehicles outside of Earth's atmosphere, space has always been politicized. In my art I want to show a more optimistic and humanistic vision of our future in space, focused on science and international collaboration. Each artwork is backed by thorough research about the subject matter. My goal is to convey the beauty and excitement of space in the hope of inspiring future generations of explorers." —Maciej Rebisz

Networks of Imagination

How can we bring together the world's most imaginative and ambitious thinkers about the future? How do we invite everyone into those conversations?

Frontera, a tabletop worldbuilding game developed by Trisha Williams and Joe Unger of Pigeon Hole Productions for a workshop on the future of learning in 2066.


WILDCARD
SYSTEM
SETTING
WHAT IF
EVENT
PERSON
FOCUS
OBJECT
POLITICAL
SOCIAL
PERSON
EVENT
WILDCARD
EVENT
TECHNOLOGY
SOCIAL
OBJECT
FOCUS
EVENT
OBJECT
FOCUS
PERSON
CLIMATE
disruption
ENVIRONMENTAL
SYSTEM
WILDCARD
OBJECT
PERSON

Minority Report

In 1999, a group of futurists selected by the Global Business Network joined Steven Spielberg to imagine how people not yet born will live, work, socialize, eat, shop, play, pray, and die. We're all familiar with the world they envisioned because it became the basis for the visionary film *Minority Report*. In November 2016, CSI collaborated with ASU's School for the Future of Innovation in Society and Hollywood Invades Tempe to reunite the original team, along with experts from ASU, to imagine the future again.

In front of a live audience, we conducted a one-day workshop where we collectively imagined a vision of the world in 2066 where everyone has access to higher education and the opportunity to learn to their highest potential. We also invited members of the public to collaborate with our invited futurists in a worldbuilding game developed by Trisha Williams and Joe Unger of Pigeon Hole, a California-based game production company. During this interactive and collaborative game, players tackled challenges that encouraged them to think boldly and creatively to craft narratives about futures shaped by universal, high-quality education.

Graphic recording created live at the 2066 futures workshop by Emily Jane Steinberg, showing the flow and interchange of ideas.

Participants

ASU Project Directors

Adam Collis, professor of practice and executive director, Film Spark
Joel Garreau, professor of law, culture, and values, Sandra Day O'Connor College of Law
Ruth Wylie, assistant director, Center for Science and the Imagination

Original *Minority Report* Visionaries

Steve Barnett, cultural anthropologist

Chris Ertel, managing director, Deloitte Consulting

Neil Gershenfeld, director, Center for Bits and Atoms, Massachusetts Institute of Technology

Shaun Jones, former director, Unconventional Countermeasures Program, Defense Advanced Research Projects Agency

Alex McDowell, production designer *(Fight Club, The Watchmen, Fear and Loathing in Las Vegas*) and director, World Building Media Lab, World Building Institute, University of Southern California

Jay Ogilvy, former director of research, Values and Lifestyles Program, SRI International

Walter Parkes, producer (*Gladiator, Catch Me If You Can, Amistad, Men in Black*), screenwriter (*Sneakers, WarGames*), former president, DreamWorks SKG

Peter Schwartz, author, *The Art of the Long View* and *Inevitable Surprises*; vice president for global government relations and strategic planning, Salesforce

ASU Experts

Brad Allenby, Lincoln professor of engineering and ethics and professor of civil, environmental, and sustainable engineering

Michael G. Bennett, associate research professor, School for the Future of Innovation in Society, Center for Science and the Imagination, and Risk Innovation Lab

Rachel Bowditch, associate professor, School of Film, Dance, and Theatre

Diana Bowman, associate professor, Sandra Day O'Connor College of Law and School for the Future of Innovation in Society

Lindy Elkins-Tanton, director, School of Earth and Space Exploration; principal investigator, Psyche Mission, NASA Jet Propulsion Laboratory

Alan Gershenfeld, founding industry fellow, Center for Games and Impact; founder and president, E-Line Media

Lance Gharavi, associate professor and artistic director, School of Film, Dance and Theatre

Traci L. Morris, director, American Indian Policy Institute

Frankenstein at 200 Exhibition

To celebrate the rich literary and cultural history of Mary Shelley's Frankenstein, *we designed and presented the* Frankenstein at 200 *exhibition in partnership with the Arizona State University Libraries in fall 2016.*

Throughout the semester, visitors experienced a mixed-media exhibition that examined the historical and social conditions of the early 19th century, which inspired Mary Shelley to pen her novel. These included books, pop culture artifacts, and stunning floor-to-ceiling artwork combining historical imagery, contemporary design elements, and catalog text. The exhibit team, led by CSI's Bob Beard, framed *Frankenstein* in its context and explored its resonance with today's scientific, technological, and social quandaries, as interpreted by collaborators across the university and throughout the community.

Featuring contributions from a variety of academic disciplines including geology, chemistry, theology, art, literature, and digital humanities, the exhibition prompted new perspectives and posed provocative questions, including:

Is a social media hashtag "alive"?

Should a painting made by a robot be considered a work of art?

What new monsters might we imagine in response to emerging technologies and new scientific discoveries?

Acclaimed as "the best exhibit that has ever been on display in the ASU Libraries" by librarian Jennifer Duvernay, "Frankenstein at 200" was a powerful avenue for contextualizing a centuries-old story for contemporary audiences.

Is It Art?

This painting was created by a robot.

In 2005, Bobby Zokaites converted a Roomba robotic vacuum from a cleaning device to an art-maker by removing the dust collector and vacuum system and replacing it with a paint reservoir. Artists have been playing with robots to make art since the 1950s. This work extends that tradition by repurposing a readily available commercial robot.

With this project, Bobby set out to create a self-portrait of a generation, one that grew up with access to vast quantities of information, constantly bombarded by advertisements. What he didn't expect was the reaction he would have to the work itself. After creating four original paintings in 2005, Bobby began questioning his artistic identity and felt that he had surrendered his creative expression to a machine. As a result, he left the project and moved into entirely different media.

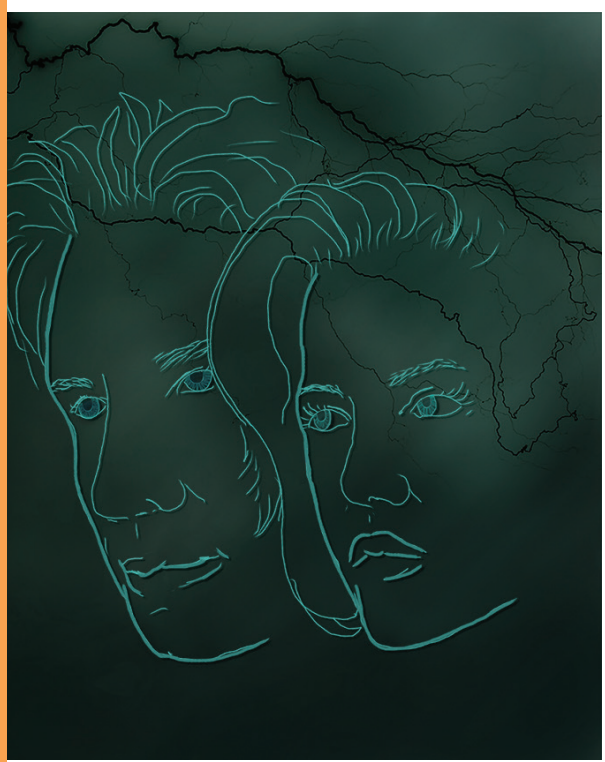
More than a decade later, Bobby revisited the project for *Frankenstein at 200*, using one of his original Roombas to interrogate *Frankenstein*'s themes of creativity and responsibility. This work was later featured at the Scottsdale Museum of Contemporary Art and in a segment broadcast nationwide on PBS Arts.

Science Fiction TV Dinners

The Science Fiction TV Dinner series is a launch pad for imaginative, engaging conversations about science, technology, and society. The series uses science fiction as an inclusive meeting ground where people from diverse professional and intellectual backgrounds—from artists, writers, and historians to scientists, engineers, and fan scholars—can bring their expertise and knowledge to the conversation.

Since 2012, Science Fiction TV Dinners have developed an enthusiastic following on and off campus, providing an opportunity for people of all ages and backgrounds to come together, learn, and explore visions of the future in an entertaining, informal setting.

At each event, we serve dinner, screen an episode of a classic or contemporary science fiction television show, and have a conversation about key themes, debates, and ethical quandaries. Science Fiction TV Dinners bring science, art, and storytelling into dialogue and provide a platform for collectively exploring a diverse array of future visions.



September 2016: *Star Trek: The Next Generation*
Speakers: Ceramics curator Garth Johnson and clinical psychologist Kerri Salamanca

November 2016: *Black Mirror*
Speakers: Internet sociologist Alexander Halavais and theatre director Jason Scott

January 2017: *CSI: Cyber*
Speakers: Cybersecurity experts Joe Gervais and Jamie Winterton

March 2017: *The X-Files*
Speakers: Political scientist David H. Guston and science education scholar Rae Ostman

April 2017: *Occupied*
Speakers: Fiction author Matt Bell and environmental historian Paul Hirt

Unexpected Frankensteins

Mary Shelley's *Frankenstein* has endured for nearly 200 years because its themes go a lot deeper than lightning storms and shambling, monosyllabic monsters. Building on the success of last year's History of the Future film series, we partnered again with Filmbar, a local independent cinema, to present a slate of screenings that examined *Frankenstein*'s legacy across disparate pop culture genres.

Facilitated by members of the Frankenstein Bicentennial Project, the series celebrated the enduring power of Shelley's original narrative by following its echoes in stories of body horror, artificially intelligent companions, suburban angst, and vicious high school cliques. Sometimes surprising, always enlightening, Unexpected Frankensteins generated new conversations about human creativity and its broader ramifications.

January 2017: *Weird Science* (1985)
Speaker: Bob Beard

February 2017: *Them!* (1954)
Speaker: Joey Eschrich

March 2017: *Fullmetal Alchemist: Conqueror of Shamballa* (2005)
Speaker: Peter Nagy

May 2017: *The Fly* (1986)
Speaker: Joey Eschrich

June 2017: *Edward Scissorhands* (1990)
Speaker: Bob Beard

July 2017: *Her* (2013)
Speaker: Ed Finn

August 2017: *Flatliners* (1990)
Speaker: Joey Eschrich

Courtesy: Shutterstock

Imaginary Friends Happy Hours

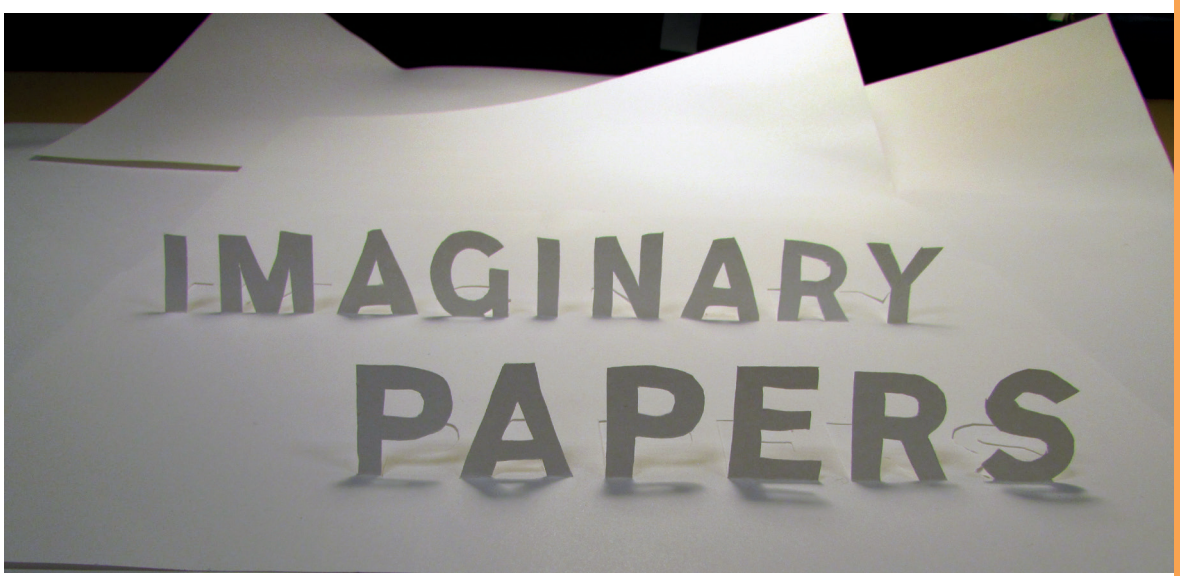
In support of CSI's goal of fostering radical collaboration, we've continued our Imaginary Friends Happy Hour series. This social event provides an unstructured space for forging new connections between ASU's talented faculty, visiting guests, and artists, makers, and innovative business leaders from the community. Each month during the academic year, CSI hosts a gathering for people from diverse backgrounds to exchange ideas about the future in a casual setting. Through the Imaginary Friends Happy Hours, we have expanded our network and planted the seeds for new collaborations with engaged and enthusiastic partners across many fields.

Imaginary Papers

Imaginary Papers is CSI's blog, hosted on the social writing platform Medium and co-edited by CSI's Joey Eschrich and Corey Pressman, a fellow of the center's Imaginary College.

Imaginary Papers imagines, negotiates, analyzes, and speculates playfully about the relationship between humans and our technology, with a particular focus on the future, especially the near future. We're interested in the ways that past and present inform our visions of the future. We want to explore our relationship with technology from the beginning of history to the most distant horizon of what might come.

We publish essays, micro-fiction, meanderings and half-baked ideas, manifestos and screeds, art, photography, interviews with those who toil in the borderlands between technology and culture, and more. We've published pieces by neuroscientists, sustainability researchers, cybersecurity experts, science fiction authors, technology journalists, staff at The Metropolitan Museum of Art, and more.



https://medium.com/imaginary-papers

Threatcasting Lab Workshop

In May 2017, ASU's Threatcasting Lab and the Army Cyber Institute conducted the Threatcasting West workshop. Threatcasting is a conceptual framework that allows multidisciplinary (public, private, and academic) groups to envision and plan for threats in the future. During the workshop, groups describe tomorrow's threats and identify specific actions, indicators, and concrete steps that we can take today to disrupt, mitigate, and recover from these future threats.

With 47 participants from diverse organizations, we created 22 unique future scenarios while exploring complex issues including the advancement of artificial intelligence, the diminishing ability to conduct covert intelligence gathering, the growing complexity of code, and future division of work between humans and machines.

Courtesy: Brian David Johnson

http://threatcasting.com

Courtesy: Brian David Johnson

Visitors and Visits

One of our great pleasures at CSI is sharing ideas and engaging with our community, both by welcoming artists, writers, researchers, and other collaborators and by participating in public lectures and panels. Here are a few highlights from the past year.

In February 2017, Joey Eschrich moderated a panel conversation, "Where Do We Go from Here? After the Apocalypse," with renowned fiction authors Paolo Bacigalupi, Matt Bell, and Benjamin Percy. The panel was part of the Desert Nights, Rising Stars annual conference, hosted by ASU's Virginia G. Piper Center for Creative Writing. The conversation covered many aspects of crafting apocalyptic and post-apocalyptic narratives, including how to provide exposition artfully, methods for mapping out narrative structure, the ethics of "disaster porn" imagery, how end-of-the world stories might reinscribe outmoded ideas about masculinity, and how glimmers of optimism might infiltrate these stories.

Acclaimed author Amitav Ghosh visited ASU in March 2017 to deliver a talk titled "War, Race and Empire in the Anthropocene: Some Occluded Aspects of Climate Change," hosted by the Virginia G. Piper Center for Creative Writing and cosponsored by CSI. Ghosh's recent book *The Great Derangement: Climate Change and the Unthinkable* explores the geopolitical underpinnings of climate.

Ed Finn delivered a mini-plenary at the annual meeting of the National Center for Women and Information Technology on May 23, 2017, discussing his new book *What Algorithms Want*. In his talk, Ed explored the consequences of our increasing dependence on computational systems for social, cultural, and ethical decision-making, usually based on an implicit or explicit assumption that such systems will be more objective and rational than humans. The gathering included researchers and teachers, industry executives, and non-profit leaders, all focused on fostering inclusion in the field of information technology.

Cory Doctorow and Ed Finn at CSI's office in Tempe.

In May 2017, celebrated author and activist Cory Doctorow visited CSI for a conversation about his new novel, *Walkaway*, our new annotated *Frankenstein* (to which he contributed an essay), and the connecting themes of the common good and the social contract. The conversation served as the first episode of CSI's occasional podcast, *CSI Conversations*.

Ruth Wylie was a participant at the Education and Lifelong Learning Foo Camp (or "Ed Foo"), an invitation-only "unconference" organized by Google, Macmillan Learning, O'Reilly Media, *Scientific American*, and Sesame Workshop. The gathering brings together experts in diverse areas of education, learning, and technology, including writers, researchers, artists, policymakers, and investors who are doing transformative education work. During the camp, Ruth, with Alan Gershenfeld, co-led a session on Designing the Future.

Novelist and literature scholar Lee Konstantinou of the University of Maryland visited us in May 2017 to deliver a lecture, "Science Fiction Satire: The Art and Craft of Making Fun of the Future." From *Gulliver's Travels* to *Snow Crash*, science fiction has long embraced satire, but it is more prominent than ever in recent years, with top authors like Margaret Atwood and Chang-Rae Lee turning to the genre. In his lecture, Konstantinou explored why science fiction satire has become so popular, how it helps us think about our complex present moment, and what types of social and political critiques it enables.

In June 2017, Ed Finn helped launch the Clute Science Fiction Library, an offshoot of the Telluride Institute in the eponymous Colorado mountain town. Ed interviewed legendary science fiction critic, archivist, and editor John Clute at the Sheridan Opera House and toured the Institute's first wing of the library. He was honored to be the first author to donate books to the collection: signed copies of *What Algorithms Want* and the new annotated *Frankenstein*. The full collection of roughly 12,000 volumes includes stunning first editions and rare books; when completed, the library will serve as a resource for writers, artists, and students.

Tangible Futures

How can we create visceral, immersive experiences of the future? How can we think critically and push the bounds of the possible through making and doing?

ASU's Jeannie Colton and Nalini Chhetri facilitate hands-on science activities as part of *Frankenstein for Families* at Emerge 2017.

Emerge photos courtesy: Tim Trumble for School for the Future of Innovation in Society

Emerge 2017: *Frankenstein*

Now in its fifth year, Emerge continues to engage artists, designers, researchers, scientists, engineers, and public audiences to explore possible futures. For 2017, the theme of this transmedia art, science, and technology festival was *Frankenstein*, the 200-year-old novel that still motivates us to think critically about our creative agency and scientific responsibility.

This year, Emerge was held concurrently with ASU's Night of the Open Door and invited visitors into a house of wonder filled with speculative technologies, fortune-tellers, music, film, and performative experiments that blurred the boundaries between art and science. The festival challenged visitors to ask what we can learn by looking at emerging science and technology through the lens of art.

CSI supported the development of the overall event and its 15 exhibits, produced *Democracy as a Service*, an interactive project by experimental philosopher Jonathon Keats, and presented *Frankenstein for Families*, a set of hands-on activities that raise questions about science and ethics.

http://emerge.asu.edu

The front entrance to Emerge 2017's house of wonder, at ASU's Tempe campus.

Democracy as a Service

Today, Google and Amazon provide countless corporations with cloud-based infrastructure solutions to achieve greater efficiency and optimization. Yet government remains stuck in the physical realm, dependent on flesh-and-blood politicians. To confront the challenges of political gridlock, bureaucratic corruption, and unreliable officials, experimental philosopher Jonathon Keats developed *Democracy as a Service*, which augments principles as old as the Founding Fathers with 21st century computer science and biotechnology. In the tradition of The Great Exhibition of 1851, where one of the earliest automated voting systems was first displayed, Keats showcased his new balloting system at Emerge 2017. The project imagines using biofeedback as a way to regulate the automated generation of laws, playfully replacing human political structures such as the Senate and House of Representatives with a series of algorithmically manipulated switches. Participants' stress levels, measured onsite at Emerge, serve as an index for increasing or decreasing the pace of new legislation.

Jonathon Keats (in lab coat and bow tie) and his team conduct an experiment about the connection between political ideas and stress levels as part of the *Democracy as a Service* project.

Emerge Gallery

< *Parlor of the Futures*, by Denisa Kera and Lauren Withycombe Keeler, merges ancient divination techniques like tarot with contemporary scenario planning and forecasting methods.

^ A scribblebot robot designed and built at the *Frankenstein for Families* table.

Emerge photos courtesy: Tim Trumble for School for the Future of Innovation in Society

Tangible Futures

Historical painter Rupert Nesbit recreates Joseph Wright of Derby's 1768 painting *An Experiment on a Bird in an Air Pump* featuring the cast of Emerge 2017. v

Karolina Sobeka explains her project, *Cloud Services*, which is based on research into the role that micro-organisms play in the dynamics of the Earth's atmosphere. ^

Radio Healer, a Native American and Xicano-led arts collective, perform a reimagined indigenous ceremony with electronic and acoustic instruments. v

^ Rachel Bowditch and company perform *Paradise Lost: Transfix at the Salton Sea* and inspire a young Emerge participant.

Looking Ahead

The year ahead will be filled with new research opportunities and publication milestones, some of which we can already glimpse over the horizon. Here are a few we are especially excited about.

Boris Karloff takes tea on the set of *Son of Frankenstein*, 1939.

Frankenstein200 Alternate Reality Game

Today's students are savvy media consumers, engaging with entertainment, advertising, and games in new and surprising ways. Our educational materials should reflect the skills and literacies of audiences in this new media landscape. In 2018, CSI will contribute to the growing field of transmedia learning and serious games with the Frankenstein200 alternate reality game. In partnership with acclaimed transmedia studio No Mimes Media, Frankenstein200 will use the tools and techniques of big-budget film and television properties to encourage critical thinking and reflection with STEM learning.

Arizona 2045 Comic Book

Later this fall, CSI will debut our first comic book designed for elementary and middle school audiences. Created by award-winning comics authors and advised by ASU sustainability scholar Paul Hirt, this original story envisions Arizona's near future through the lens of energy systems.

Primer Project

We are inspired by the technical and social questions posed by Neal Stephenson's 1995 novel *Diamond Age: Or, A Young Lady's Illustrated Primer*, in which a young girl discovers the ultimate personalized learning system: an educational technology that automatically senses her environment and helps her develop a range of cognitive and physical skills. Over the coming year, we are exploring opportunities to involve ASU students and faculty in building a prototype Primer that takes advantage of inexpensive cameras and sensors, distributed computing, and natural language processing.

Participatory Hieroglyph

To mark the fifth anniversary of CSI, we will revisit our flagship project. Working with original Hieroglyph author Elizabeth Bear, we will create a technically grounded, interactive short story, integrating crowdsourced input from members of the Hieroglyph community.

NASA Space Futures

In fall 2017, we anticipate completing a long-anticipated project funded by NASA on the near future of space exploration. Based on the interdisciplinary narrative collaboration process we pioneered with Hieroglyph, the new project brings together science fiction writers, social scientists, space experts, and others to create tresearch-based narrative scenarios about commercialization and public-private partnerships in space.

A Year Without a Winter

In early 2018, Columbia University Press will publish *A Year Without a Winter*, our collection of fiction, nonfiction, and art responding to the specter of a climate-changed future where winter drops away entirely. The anthology grew out of a workshop we hosted in 2016, and is inspired by Mary Shelley's *Frankenstein*, which was conceived 200 years earlier during the "Year Without a Summer," a global climate crisis caused by a volcanic eruption.

Educational Technology Campaign

As part of the larger Campaign ASU 2020, CSI is leading the Educational Technology campaign. After a successful kickoff meeting in the spring, we look forward to launching interdisciplinary and collaborative projects that raise support around advances in educational technology.

You can change the future!

Your decisions today shape the world your children and grandchildren will be living in, so consider making an investment in their name for their future.

Become a Futurist! We need your enthusiasm and your ideas. Join our mailing list, attend an event, or contact us directly and join a community dedicated to building a future that is for everyone.

Support the Center for Science and the Imagination and help us explore more ambitious and challenging questions. Your gift will help to:

Create research opportunities for students

Draw new and under-represented communities into our work

Study and perform imaginative thinking

Conduct research at the intersection of the sciences, humanities, and arts

Build a future that is for everyone!

http://imgn.how/donate

All funds will be deposited with the ASU Foundation for A New American University, a non-profit organization that exists to support Arizona State University (ASU). Gifts in support of ASU are subject to foundation policies and fees. Your gift may be considered a charitable contribution. Please consult your tax advisor regarding the deductibility of charitable contributions.

A young builder makes a Scribblebot at ASU's Night of the Open Door.

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