



**Center for  
Science and the  
Imagination**

**Arizona State  
University**

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The pace of disaster has only seemed to quicken in the past year, from the horrific murder of George Floyd to the distended catastrophe of COVID-19. As cynical as it might be to say so, neither of these crises was a surprise. The pervasive brutality of police violence against people of color has been documented countless times. The pandemic was predicted in detail by countless experts and storytellers, to no avail. Paradoxically, we have been suffering through failures of the imagination—scenarios that we knew about but pushed aside, risks that we collectively preferred to “unsee.” Now we reap the consequences, watching more death and trauma unfold on the streets, in hospital rooms, in nursing homes, in the kitchens and quiet corners of millions of homes that have been economically, socially, and emotionally disrupted.

**“Imagination is what keeps us going through the darkest of times.”**

Our crises are coming at us in battalions. And yet, imagination is what keeps us going through the darkest of times. At CSI we assert that Black Lives Matter, and that when we imagine the future, we need to include everyone in that process, especially people of color, Indigenous peoples, LGBTQIA+ communities, and others who have been systematically marginalized and oppressed by the engines of progress and profit.

Everything happening now is familiar, if only we look to the novels of Octavia E. Butler, the incisive nonfiction of Hannah Arendt, the writings and speeches of Nelson Mandela and Martin Luther King, Jr. And when those stories aren't available, because we have forgotten the lessons of history, or we have failed to educate ourselves, or we are trapped in situations where we must rely on our own resources, the first resource is imagination. Imagination allows us to see past the obstacles and envision a path forward: a victory condition, a compromise, or a new calculus. Imagination is the ignition system for resilience, empathy, and anticipation.

The work of the Center for Science and the Imagination in the past year has grappled with both the present catastrophes and the distant thunderclouds. In February, we continued our tradition of honoring Black History Month with a focus on Black Futures, welcoming author and editor Troy L. Wiggins to lecture on campus in partnership with the Institute for Humanities Research and the School for the Future of Innovation in Society. We also continued our partnership with FilmBar in downtown Phoenix, screening John Sayles' *The Brother from Another Planet* with an introduction from ASU scholar, author, and game designer Malik Toms.

In the fall of 2019, we published *Future Tense Fiction* with Unnamed Press, featuring stories from the first two years of our collaboration with Slate's Future Tense. We celebrated with book launch events in New York, Washington, D.C., San Francisco, and Phoenix. These narratives addressed automation, climate change, food security, and many other challenges, all through the lens of our shared humanity and with a feeling of hope. Among other accolades, contributing author Annalee Newitz won the 2019 Theodore Sturgeon Memorial Award for her Future Tense Fiction story, "When Robot and Crow Saved East St. Louis."

We also welcomed our two teachers in residence, Deena Gould and Tyler Eglen, and they spent an incredibly productive year conducting studies related to our Frankenstein transmedia project and training pre-service teachers. Their contributions to research, writing, curriculum, and training materials have been invaluable, including a number of conference presentations and articles in journals for scholars and practitioners. These efforts will help disseminate the findings and educational resources of the Frankenstein Bicentennial Project to educators and researchers around the world.

The pandemic has caused us to shift our course in many ways. The annual art-science festival Emerge has been delayed (until 2022), as were workshops supported by the National Endowment for the Humanities and a book sprint for the Comparative and International Education Society annual conference. In lieu of our regular in-person programming like the Science Fiction TV Dinner series, our team quickly developed virtual events to meet the needs of our unsettled, quarantined times. Us in Flux, a new series of micro-fiction narratives and public dialogs, has attracted thoughtful engagement and served as a model for how we talk about imagination as a public good and a critical resource in times of crisis.

As we look forward, it's clear that imagination is more important than ever. We must deepen our empathy as well as our powers of anticipation, remembering to care for strangers and to support the common good. We must stretch our horizons, thinking beyond immediate disasters to make choices that value the long term and avoid saddling future generations with the consequences of our failings. And, most of all, we must continue to dream, pursuing the moral arc of the universe to define and create a future we can proudly share with coming generations.

In solidarity,

A handwritten signature in black ink, appearing to read "Ed Finn". The signature is fluid and stylized, with the first name "Ed" being more prominent than the last name "Finn".

Ed Finn  
Director

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# About the Center

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At the Center for Science and the Imagination at Arizona State University, our mission is to ignite collective imagination for a better future. We create inspiring, inclusive, technically grounded visions of the future by bringing together artists, authors, and educators with scientists, technologists, policy thinkers, and community members. We publish collections of science fiction, nonfiction, and art; lead informal and formal education initiatives around science, technology, culture, and society; host public events and forums and create podcasts and videos about science fiction, media arts, and possible futures; conduct interdisciplinary research about collaboration and imagination; and more.

Our projects have been supported by NASA, the U.S. National Science Foundation, the William and Flora Hewlett Foundation, the Alfred P. Sloan Foundation, Intel Corporation, Google, the U.S. National Endowment for the Humanities, Ingka Group, the Spencer Foundation, and the World Bank.

We have collaborated with organizations including the U.S. National Renewable Energy Laboratory, Slate magazine, New America, the Society for Scholarly Publishing, National Novel Writing Month, the Science Fiction Research Association, Leonardo/The International Society for the Arts, Sciences, and Technology, the MIT Press, the Mexican Space Collective, CoFUTURES at the University of Oslo, Creative Nonfiction magazine, the National Informal STEM Education Network, the ClimateWorks Foundation, and the Joan Ganz Cooney Center at Sesame Workshop.

# CSI Publications 2019-20

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## Books



Berg, K., Bosch, T., Eschrich, J., Finn, E., Martinez, A., & Ulman, J. (Eds.) (2019). *Future Tense Fiction: Stories of Tomorrow*. Los Angeles, CA: Unnamed Press.

## Research Publications

Aguilera, E., Stewart, O. G., Mawasi, A., & Cortés, L. E. (2020). Seeing Beyond the Screen: A Multidimensional Framework for Understanding Digital-Age Literacies. In Sullivan, P. Lantz, J., & Sullivan, B. (Eds.), *Handbook of Research on Integrating Digital Technology with Literacy Pedagogies* (pp. 1-31). Hershey, PA: IGI Global. <https://doi.org/10.4018/978-1-7998-0246-4.ch001>

Gould, D., Eglen, T., & Wylie, R. (2020). 5E + Empathy: How To Deepen Student Inquiry About Genetics and Genome Editing Through Narrative Role-Playing. Presentation at National Science Teachers Association Area Conference, Phoenix, AZ. (Conference canceled)

Hudson, A., Finn, E., & Eschrich, J. (2019). The Intelligence Imaginary: Seeking Lessons from Science Fiction in the Era of Almost-Real AI. Presentation at the 33rd Annual Meeting of the Society for Literature, Science, and the Arts, University of California, Irvine.

Lemos, J., & Finn, E. (2019) Babel VR: Multimodal Virtual Reality Environment for Shelf Browsing and Book Discovery. In Stephanidis, C., & Antona, M. (Eds.), *HCI International 2019 – Late Breaking Posters* (pp. 30-38). Cham, Switzerland: Springer. [https://doi.org/10.1007/978-3-030-30712-7\\_5](https://doi.org/10.1007/978-3-030-30712-7_5)

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Mawasi A., Ahmed, I., Walker E., Wang, S., Marasli, Z., Whitehurst, A., & Wylie, R. (2020). Using Design-Based Research to Improve Help-Giving in a Middle School Math Classroom. In Gresalfi, M., & Horn, I. S. (Eds.), *The Interdisciplinarity of the Learning Sciences, 14th International Conference of the Learning Sciences (ICLS) 2020, Volume 2* (pp. 1189-1196). Nashville, Tennessee: International Society of the Learning Sciences.

Mawasi A., Nagy, P., & Wylie, R. (2020). Systematic Literature Review on Narrative-Based Learning in Educational Technology Learning Environments (2007-2017). In Gresalfi, M., & Horn, I. S. (Eds.), *The Interdisciplinarity of the Learning Sciences, 14th International Conference of the Learning Sciences (ICLS) 2020, Volume 3* (pp. 1213-1220). Nashville, Tennessee: International Society of the Learning Sciences.

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Nagy, P., Eschrich, J., & Finn, E. (2020). Time Hacking: How Technologies Mediate Time. *Information, Communication & Society*. Forthcoming in print. <https://doi.org/10.1080/1369118X.2020.1758743>

Nagy, P., Wylie, R., Eschrich, J., & Finn, E. (2019). Facing the Pariah of Science: The Frankenstein Myth as a Social and Ethical Reference for Scientists. *Science and Engineering Ethics* 26, 737–759. <https://doi.org/10.1007/s11948-019-00121-3>

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**Mission**

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**Igniting  
collective  
imagination  
for a better  
future.**







Future Tense Fiction  
AI Policy Futures  
Imagination and Climate Futures  
Cities of Light  
Climate Justice in India



Black Futures Month  
Science Fiction TV Dinners  
CSI Skill Tree  
Imaginary Papers  
The Imagination Desk

Veterans Imagination Project  
Flights of Imagination  
ClimateWorks Fiction Event  
Applied Imagination Workshop in Tokyo  
Visits and Visitors



Us in Flux  
COVID-19 Cancellations and Ways Forward



Frankenbook  
Grand Challenges Engineering  
Phoenix Country Day School Emerge Pilot  
Ubiquitous Collaboration Support (UbiCoS)  
Frankenstein200 Progress



# Science & Imagination

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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 panel conversation at the Future Tense Fiction book launch event at Changing Hands in Phoenix. From left: CSI director Ed Finn, sport and society scholar Victoria Jackson, and author Maureen McHugh.



## Center for Science and Imagination



# Future Tense Fiction

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CSI continues to publish Future Tense Fiction, a monthly series of science fiction stories in Slate magazine. Over the course of the year, Future Tense Fiction has brought another diverse group of accomplished authors into the series. Each story is accompanied by original artwork and a nonfiction response essay by an expert exploring some technical or research-based aspect of the science fiction.

Future Tense Fiction is an exciting extension of the larger Future Tense partnership between ASU, Slate, and New America. We are also proud to partner with 3 Arts Entertainment in Los Angeles, creating opportunities to adapt these stories for film, television, and the web. 3 Arts complements our existing networks with its track record of major hits as a talent management and production company, including TV shows *The Good Place*, *Parks and Recreation*, and *American Vandal*, as well as numerous films. Several Future Tense Fiction stories are in various stages of the production process.

Future Tense Fiction continues to earn accolades in the science fiction community, with stories from the project included in the anthologies *The Best Science Fiction of the Year: Volume 4*, edited by Neil Clarke, and *The Best American Science Fiction and Fantasy 2019*, edited by Carmen Maria Machado and John Joseph Adams. Our stories will also be included in two forthcoming anthologies: *The Year's Best Science Fiction Vol. 1: The Saga Anthology of Science Fiction 2020*, edited by Jonathan Strahan, and *The Best American Science Fiction and Fantasy 2020*, edited by John Joseph Adams and Diana Gabaldon. In The Washington Post's wrap-up of the best science fiction and fantasy of 2019, reviewer

Lavie Tidhar wrote that Chinelo Onwualu's story "What the Dead Man Said" is "quietly devastating SF."

Our stories from 2019-2020 are:

**July 2019: "Zero in Babel,"** by E. Lily Yu, with a response essay by law professor Diana M. Bowman

**August 2019: "What the Dead Man Said,"** by Chinelo Onwualu, with a response essay by Valeria Fernández, a journalist who specializes in immigration

**September 2019: "Double Spiral,"** by Marcy Kelly, with a response essay by bioethicist Josephine Johnston

**October 2019: "Affordances,"** by Cory Doctorow, with a response essay by digital artist and educator Nettrice Gaskins

**November 2019: "A Priest, a Rabbi, and a Robot Walk Into a Bar,"** by Andrew Dana Hudson, with a response essay by Ruth Graham, a journalist who specializes in religion

**December 2019: "Actually Naneen,"** by Malka Older, with a response essay by digital humanities professor Ed Finn

**January 2020: "The Truth Is All There Is,"** by Emily Parker, with a response essay by investor and economics researcher Jill Carlson

**February 2020: "It Came From Cruden Farm,"** by Max Barry, with a response essay by Sarah Scoles, a journalist who covers UFO culture

**March 2020: "Paciente Cero,"** by Juan Villoro, with a response essay by recycling expert Adam Minter

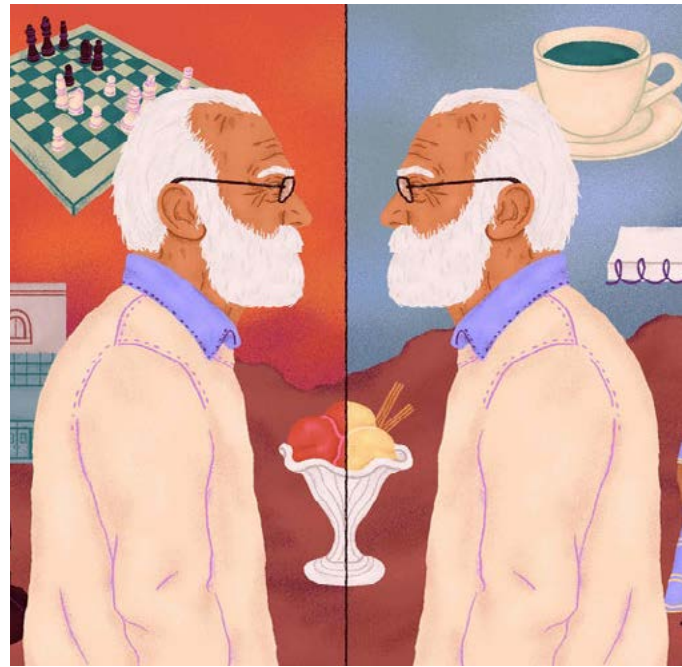


## Science & Imagination

**April 2020: “Daffodil’s Baby,”** by Alyssa Virker, with a response essay by David Plotz, author of the book *The Genius Factory: The Curious History of the Nobel Prize Sperm Bank*

**May 2020: “Scar Tissue,”** by Tobias S. Buckell, with a response essay by John Frank Weaver, an attorney who works on artificial intelligence law

**June 2020: “The Last of the Goggled Barskys,”** by Joey Siara, with a response essay by Brigid Schulte, director of the Better Life Lab at New America



Upper-left, illustration by Natalie Matthews-Ramo for “The Last of the Goggled Barskys”

Upper-right, illustration by Janina Romero for “Paciente Cero”

Bottom-right: illustration by Lisa Larson-Walker for “Daffodil’s Baby”

Bottom-left: illustration by Franco Zacharzewski for “A Priest, a Rabbi, and a Robot Walk Into a Bar”





Top: Maureen McHugh gives a reading from her Future Tense Fiction story, "The Starfish Girl," at a book launch event in Phoenix. Bottom-left: Attendees to our Phoenix launch event wait in line to have their books signed. Bottom-right: Authors Maureen McHugh (left) and Paolo Bacigalupi (right) sign books at the Phoenix launch.

# Future Tense Fiction Anthology

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In October 2019, in collaboration with Unnamed Press, we published *Future Tense Fiction: Stories of Tomorrow*, an anthology collecting our first 14 Future Tense Fiction stories, which originally ran on Slate between 2016 and 2018. The book received an incredible critical response, including starred reviews from Publishers Weekly and Kirkus and strong reviews from Booklist, Polygon, Amazing Stories, Shelf Awareness, Seattle Book Review, Locus Magazine, and more.

"This dynamic, dud-free anthology of 14 short stories written by some of speculative fiction's greats provides gripping, convincing glimpses into various near futures... essential reading for anyone intrigued by what might come next for humankind." — Publishers Weekly

"These 14 intelligent and complex stories hold both hopes and fears for our future, presenting poignant and fascinating tales of what we should consider as we alter our world." — Leah von Essen, Booklist

"Even when the chips are down — and there are some genuinely sinister stories here — this collection still feels like it gazes forward with hope, which is a marvelous, rare thing these days." — Glenn Dallas, Seattle Book Review

"Readers who appreciate Arthur C. Clarke and William Gibson's attention to science and Ursula Le Guin and Ted Chiang's beautiful literary voices will find a lot to love here." — Eric Aldrich, Full Stop

"Because of the diversity of its authorship, this anthology does more than imagine what the world might be like if all of our perspectives were included. Instead, it moves past the picture of representation to a clear, uncompromising, imaginative look at just what it is we are all included in." — Kirkus

We launched the anthology with a series of events across the United States, bringing fiction authors from the book into dialog with journalists, historians, legal scholars, and leaders working at the intersection of science, technology, public policy, education, and the future:

### October 10

#### **Changing Hands Bookstore, Phoenix**

featuring fiction authors Paolo Bacigalupi and Maureen McHugh in conversation with Diana M. Bowman, associate dean for international engagement at ASU's Sandra Day O'Connor College of Law, and Victoria Jackson, scholar of sport and society at ASU's School of Historical, Philosophical, and Religious Studies

### October 15

#### **Ford Foundation Center for Social Justice, New York City**

featuring fiction authors Ken Liu, Emily St. John Mandel, and Mark Oshiro in conversation with Daniel Grushkin, founder and director of the Biodesign Challenge

### October 22

#### **Smithsonian Arts and Industries Building, Washington D.C.**

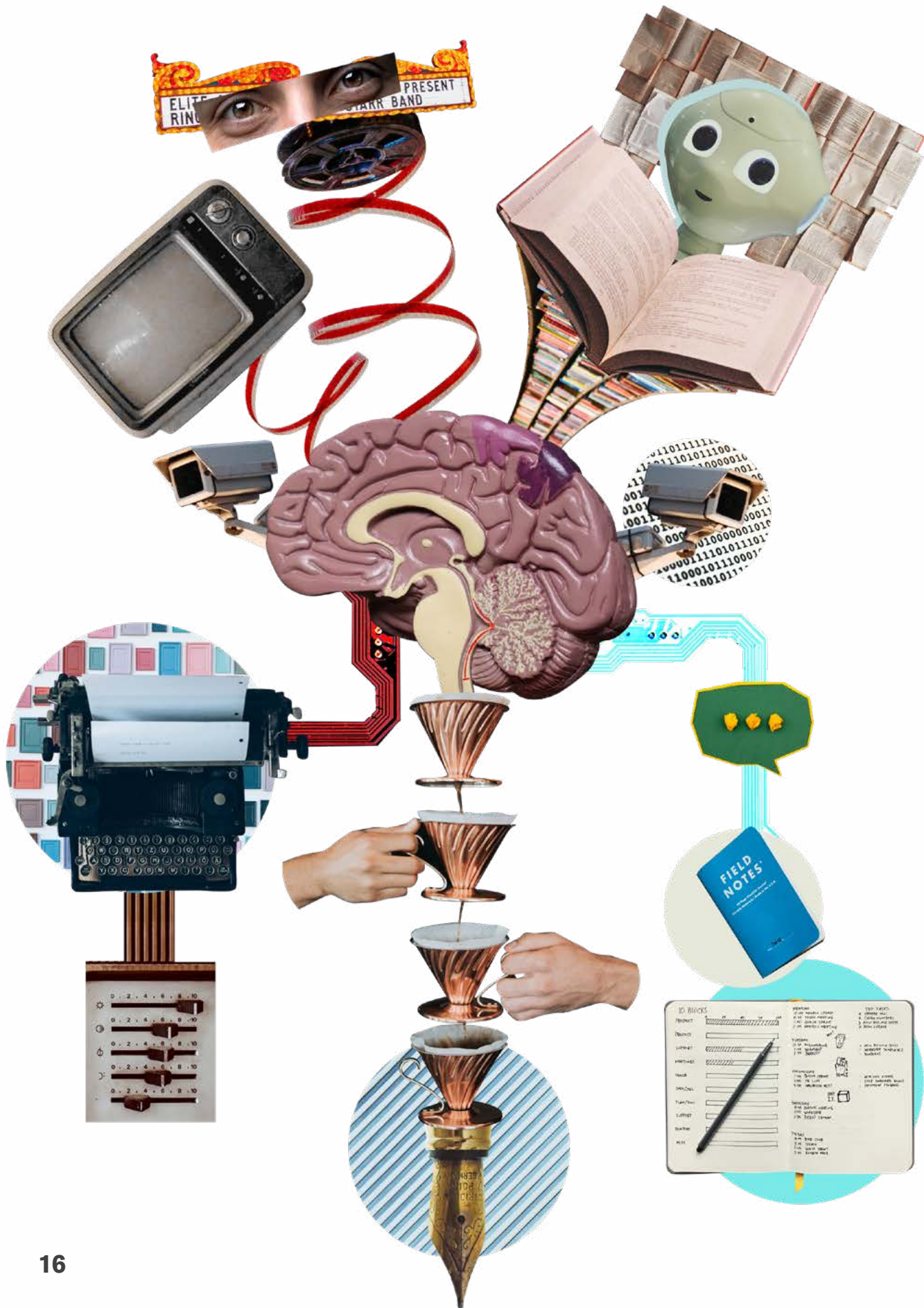
featuring fiction author Lee Konstantinou in conversation with France A. Córdova, director of the National Science Foundation, Ellen Stofan, director of the National Air and Space Museum, and Michael Crow, president of ASU

### October 30

#### **Green Apple Books on the Park, San Francisco**

featuring fiction authors Meg Elison, Annalee Newitz, and Hannu Rajaniemi in conversation with Torie Bosch, editor of Slate's Future Tense channel.







# AI Policy Futures

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The AI Policy Futures project addresses the question of how storytelling can enhance policy deliberations and public dialog around how we define, regulate, and assess artificial intelligence (AI) technologies. After hosting a large public gathering in May 2019 at New America, we have devoted the past year to developing a taxonomy of AI depictions in science fiction, conducting interviews, and publishing a series of AI-themed short stories as part of the Future Tense Fiction series in Slate.

The most ambitious of our deliverables was the development of a draft taxonomy of how AI has been portrayed in science fiction literature and film. To begin, we worked with our advisory board to develop a series of interview questions covering which science fiction works and narratives are most insightful and influential. We also formulated questions about the future of AI and the complexities of AI governance. Then, graduate researcher Andrew Dana Hudson conducted a dozen interviews with a mix of AI researchers and science fiction thinkers. These provided a unique reservoir of insight that informed the rest of the project, and that we are now synthesizing into a scholarly publication.

In the fall of 2019, Slate's Future Tense channel published the first three of our six commissioned short stories. Bestselling novelist and prominent activist Cory Doctorow wrote about abuse and exploitation in the production and use of facial recognition and algorithmic policing, with a response essay by digital artist and educator Nettrice Gaskins. Andrew Dana Hudson, also a burgeoning science fiction author, wrote a story about new AI ethics complexities in creating voice agents to serve religious groups, with a response by Slate religion writer Ruth Graham. Sociologist and science fiction novelist Malka Older wrote about how we deal with obsolescence in AIs designed to care for our children, with a response by Ed Finn. A second package of three stories about the intersection of AI and justice will be running in Slate later this year. These stories and nonfiction essays continue to drive public conversation about the near future of AI, including at MuseWeb, a digital media conference, where Nettrice Gaskins and Cory Doctorow reprised their exchange on AI as a keynote lecture.

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AI Policy Futures is supported by the Hewlett Foundation and Google.

Illustration by Venkatesh Lakshmi Narayanan

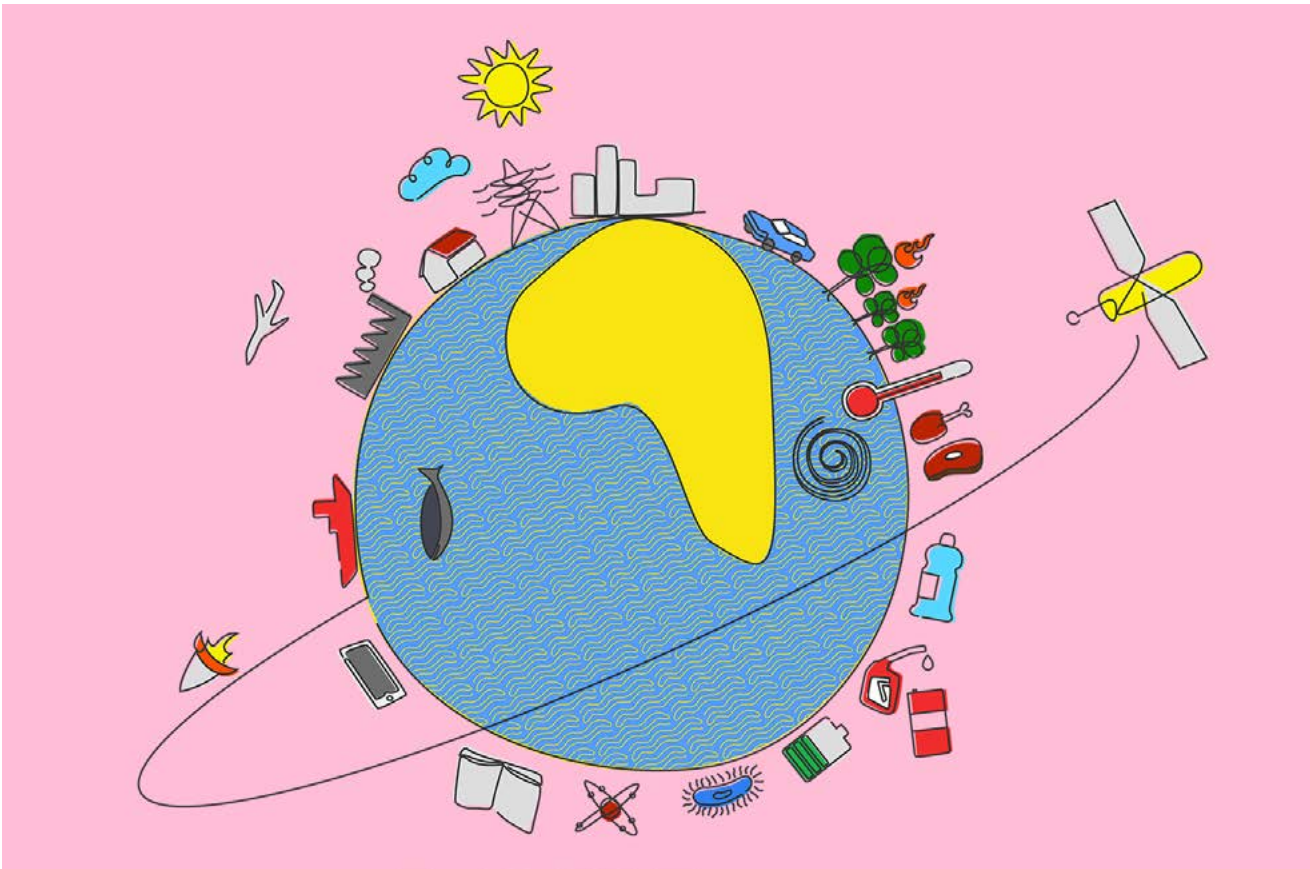


Illustration by Venkatesh Lakshmi Narayanan

## Imagination and Climate Futures

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A partnership with ASU's Virginia G. Piper Center for Creative Writing, 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.

## Everything Change Climate Fiction Contest 2020

Inspired by the enthusiastic international response to our climate fiction contests in 2016 and 2018, we were proud to host our third contest in 2020—a momentous year for climate action and activism, and an unprecedented opportunity to reimagine how humans will live on this planet in the future.

Our theme for this third contest centers on the concept of planetary boundaries: a set of processes, from land use and pollution to biodiversity and climate change which, together, define a safe operating space for humanity's long-term survival and flourishing on Earth.

What would our world look like if we actually respected and lived within planetary boundaries—at the individual level, yes, but more importantly at the level of organizations, communities, and societies, and at the level of global human civilization? How might politics, culture, relationships, and identities—all of the messiness of human lives—change in a world where we're grappling seriously with the climate crisis, and perhaps even trying to restore some of the damage we've already done to the planet and its ecosystems? How can we ensure that a sustainable future is also a just and equitable one?

Our lead judge is Claire Vaye Watkins, a former Guggenheim Fellow, winner of The Story Prize and the New York Public Library Young Lions Fiction Award, and author of *Gold Fame Citrus*, a climate fiction novel that was named a best book of 2015 by The Washington Post, The Atlantic, and NPR. Claire will join an interdisciplinary group of judges with expertise in climate science, sustainability, creative writing, and environmental literature.

This year's contest built on the truly global reach of previous contests, attracting more than 580 original short story submissions from 77 different countries.

Our grand prize winner and finalists will be featured in a digital anthology, which will be free to download, read, and share.

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Support for the 2020 contest is provided by Ingka Group, the largest retailer and a strategic partner in the IKEA franchise system, operating nearly 380 IKEA stores in 30 countries. We look forward to working with our partners at Ingka to share the stories and catalyze creative, globally inclusive thinking about how we can change ourselves in the face of the climate crisis and find ways to thrive together in a more sustainable and equitable future.

# Cities of Light

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How will a transition to clean, plentiful solar energy reshape our cities—both the communities inside and around urban spaces, and the architecture, aesthetics, and infrastructure of the spaces themselves? As a follow-up to our Weight of Light workshop in 2018 and anthology in 2019, we partnered with the U.S. National Renewable Energy Laboratory (NREL) and ASU's Center for Energy and Society for a workshop on decarbonized urban futures at NREL headquarters in Golden, Colorado, in February 2020.

We convened four teams, each composed of a science fiction author, a student researcher, a visual artist, and at least one technical expert and social scientist. The workshop was organized as a two-day narrative hackathon, designed to create stories, visual renderings, and essays that trace pathways to cleaner, more equitable energy futures in four cities: Chicago, Illinois; Portland, Oregon; San Juan, Puerto Rico; and San Antonio, Texas.

Narrative Hackathons are intensively collaborative, structured as a series of short interactive sessions with clear goals and deliverables. Throughout the event, our teams oscillated between small-group brainstorming, large-group presentations, cross-group feedback, revisions and refinement, and individual working time. We were also treated to a fascinating tour of the NREL campus, with behind-the-scenes glimpses at breathtaking labs and cutting-edge technologies for energy

generation, clean mobility, and decision-making. In the wake of the event, the teams continued their conversations and worked with editors to sharpen and finalize their stories, artworks, and essays.

The purpose of this project is not to predict the future design of specific solar energy systems, or to divine the future of cities. Instead, we hope to encourage dialog, debate, and critical thinking about how to navigate the transition from today's fossil-fuel economies to future alternatives that are culturally responsive and inclusive, and that honor and amplify the uniqueness and beauty of cities.

We will publish the fiction, essays, and art coming out of the narrative hackathon in *Cities of Light*, a free digital book, in early 2021.

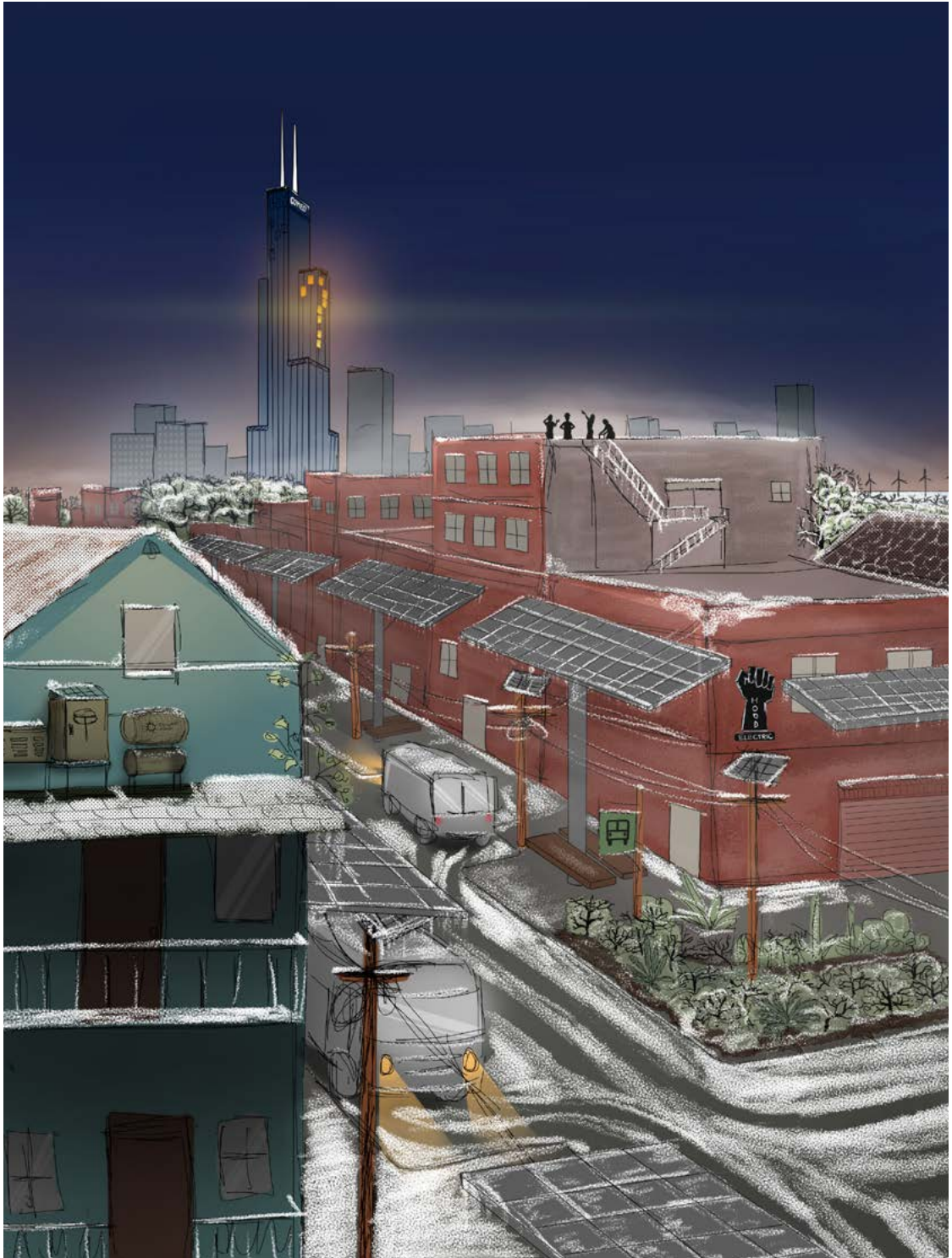


This material is based on work supported by the National Science Foundation under Grant No. 1041895.

[csi.asu.edu/books/cities-of-light](https://csi.asu.edu/books/cities-of-light) 

An illustration for Paolo Bacigalupi's story "Efficiency,"  
about a solar-powered future for the South Side of Chicago,  
by Venkatesh Lakshmi Narayanan.

## Science & Imagination







Kolam artwork by  
Venkatesh Lakshmi Narayanan.

Kolam is temporary street art created using rice flour on wet soil in Southern India. This kolam consists of a geometrical pattern derived from a 9x9 dot grid (puli kolam) in the center and freeform artwork around it. The freeform artwork usually depicts divine animals, religious symbols, and common harvests. The overall motive of this art form is to celebrate harmonious coexistence of humans and other living beings in the ecosystem.

# Climate Justice in India

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Today's escalating climate chaos is intensified by global threats to democracy, violent backlashes to migration, and horrific biodiversity loss. Furthermore, environmental degradation is exacerbating existing inequalities, with poor and marginalized people bearing the brunt of crises they had virtually no hand in creating. Mainstream climate discourse often sees the most impacted people as disposable, or as victims to be saved by top-down interventions that maintain the same order that gave rise to the catastrophe. Truly useful engagement with the climate crisis must involve not only technology, but also alternate visions of social and economic arrangements, and different ways of thinking about the interrelationships of humans with the broader natural world. These fresh perspectives are likely to come from the marginalized and oppressed. The "most vulnerable" often exhibit a remarkable capacity to survive, as well as creativity and adaptability under difficult conditions, and with scarce resources.

This project will look to people at the margins of the current global order, creating speculative fiction and nonfiction that imagines actionable, inspiring, bottom-up solutions and adaptations. We will focus on India—a geographically and culturally diverse and severely climate-stressed nation which is among the most densely populated regions in the world, and ranks high on measures of social and economic inequality.

In collaboration with CSI Imaginary College fellows Bodhisattva Chattopadhyay and Vandana Singh, we will publish a free ebook, with an accompanying print edition, featuring speculative fiction stories by five authors from a diverse range of backgrounds within India and in the global diaspora—along with essays, manifestos, and works of creative nonfiction. Our fiction authors will craft their visions of the future in collaboration with scholars and activists, grounding their work in the latest thinking about technology, politics, sociology, philosophy, culture, legal theory, and more.

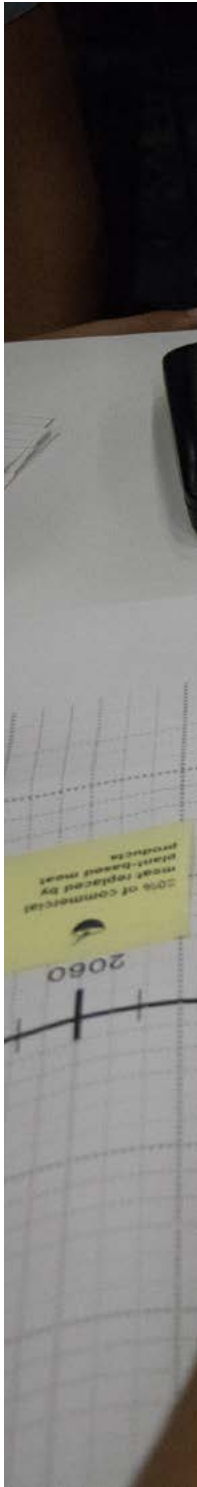
Fiction authors working on the project include Gladson Dungdung, Jacinta Kerketta, Easterine Kire, Mimi Mondal, and Gogu Shyamala. Due to the disruptions caused in India and around the world by the COVID-19 crisis, we are extending the project into 2021-2022. In the meantime, we are preparing a series of interviews with our fiction authors, exploring themes of climate justice and community, and examining how they have dealt with these themes in their previous works.

# Networks of Imagination

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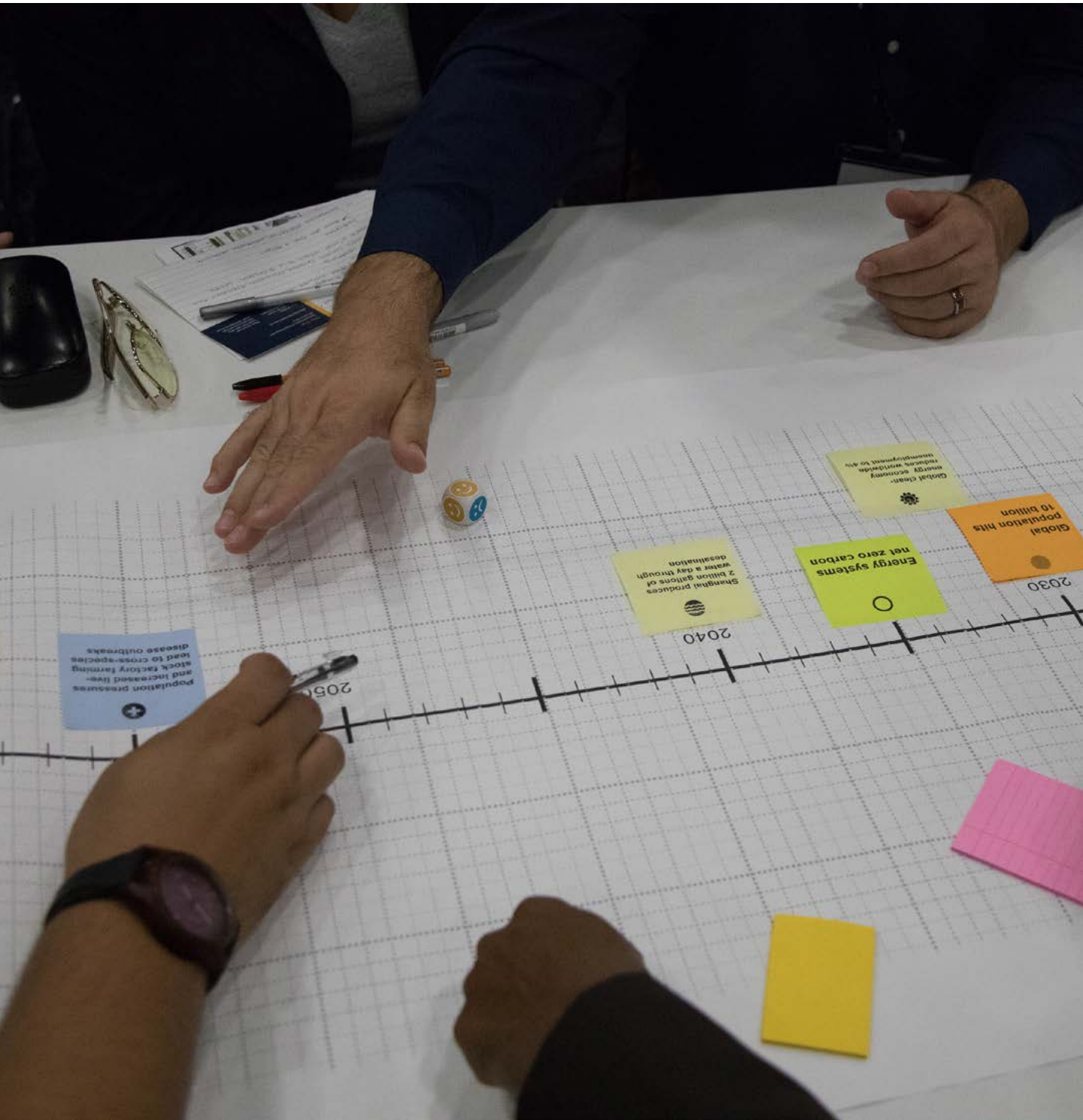
How can we bring together the world's most imaginative and ambitious thinkers about the future? How do we invite everyone into those conversations?

Participants at our Applied Imagination Workshop in Tokyo work together to create a speculative future timeline.





# Center for Science and Imagination





## Black Futures Month

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Science fiction has a pervasive influence on how we think about the future, and the stories we tell ourselves today will have a role in shaping what's to come. As we strive to create a world that is inspiring, inclusive, and truly just, it is essential to look to the stories and storytellers that are giving us those visions now.

In February 2020, in partnership with ASU's Institute for Humanities Research and the School for the Future of Innovation in Society, CSI hosted a series of events celebrating Black Futures Month. Through public lectures, salons,

film screenings, and interviews, this series examined a diverse array of speculative art for and by people of the African continent and the African Diaspora.

First, we welcomed author, editor, and FIYAH Literary Magazine cofounder Troy L. Wiggins to ASU's Tempe campus. In his lecture, "The Future Ain't Gonna Write Itself," Wiggins led an examination of Black speculative fiction and the power of storytelling to radically reimagine the past, reckon with the present, and build revolutionary visions of the future. We also

## Networks of Imagination

recorded an interview with Troy for our podcast series The Imagination Desk, which will be released in late 2020.

Second, in partnership with FilmBar, an arthouse theater in Phoenix, we hosted a screening of John Sayles's groundbreaking film *The Brother from Another Planet*. With an introductory discussion from scholar, author, and game designer Malik Toms, we considered how this film, along with more contemporary works, uses the tools of speculative fiction—the magical, the fantastic, and the imaginative—to examine the lived experiences of Black Americans.

Informed by these discussions and curated by our colleagues and visiting scholars, CSI created a Black Speculative Art Reader. Featuring works of literature, film, music, and scholarship, this guide is a resource for anyone looking to engage with fresh perspectives and possibilities for a better world.

[csi.asu.edu/black-futures](https://csi.asu.edu/black-futures) 



Author and editor Troy L. Wiggins discusses Black speculative fiction with an attendee following his lecture at ASU's Tempe campus.

In February 2020, CSI's Bob Beard was invited to speak at the JAZZmeetsPOETRY event series at The Nash, a top jazz venue in Phoenix, as part of an event celebrating musician and poet Sun Ra. A pioneer of Afrofuturism and one of the most prolific recording artists of the twentieth century, Sun Ra wrote:

*Imagination is a magic carpet  
Upon which we may soar  
To distant lands and climes  
And even go beyond the moon  
To any planet in the sky  
If we came from nowhere here  
Why can't we go somewhere there?*



# Science Fiction TV Dinners

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The Science Fiction TV Dinner series is a launch pad for imaginative, engaging conversations about science, technology, and society. We use 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 a passionate 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 discuss key themes, debates, and ethical quandaries. Science Fiction TV Dinners bring science, art, and storytelling into dialog and provide a platform for collectively exploring a diverse array of future visions.

We postponed our April 2020 TV Dinner, which was slated to feature a near-future episode from the final season of *Parks and Recreation*, because of the COVID-19 pandemic. We look forward to reconfiguring the TV Dinners as a series of virtual events for the 2020-2021 academic year, and continuing these searching and whimsical (and nutritious!) conversations about the future.

## **October 2019: Star Trek: Discovery**

Speakers: Media artist and community-based researcher Alexandrina Agloro and autonomous systems engineer Ted Pavlic

## **November 2019: Max Headroom**

Speakers: Science, technology, and society scholar David H. Guston and radio journalist and producer Sarah Ventre

## **February 2020: Stargate SG-1**

Speakers: Analog astronaut and geoscientist Sian Proctor and neurobiologist Stephen Pratt

Top: Attendees dig into their TV Dinners. Middle: CSI's Joey Eschrich (left) moderates a conversation about *Stargate SG-1* with biologist Steven Pratt (middle) and analog astronaut Sian Proctor (right). Bottom: Joey Eschrich kicks off our *Max Headroom* TV Dinner event with some historical and cultural context for the show's unique brand of late-1980s bedlam.

[csi.asu.edu/science-fiction-tv-dinners](https://csi.asu.edu/science-fiction-tv-dinners) 



# CSI Skill Tree

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Video games are an increasingly crucial space for storytelling, and for making big ideas tangible through the lens of future worlds and alternate realities. But despite their growing global prominence as a medium, they cast a curiously narrow cultural shadow. For many of us, games are unknown territory, and they can sometimes feel intimidating and insular.

CSI Skill Tree is our response to this strange contradiction: a new series that examines and celebrates how video games envision possible futures, build rich and thought-provoking worlds, and engage people as active participants in unfolding and interpreting stories. Our guests will include game developers, scholars, critics and journalists, science fiction authors, and other folks working at the intersection of technological change and story craft.

In our first episode, in June 2020, we discussed *Subsurface Circular*, a mystery-adventure game about intelligent machines, structural oppression, and public transit. Our special guests were Liz Fiacco, a game developer who has worked on both experimental/indie titles and major-studio hits like *Uncharted 4: A Thief's End* and *Pillars of Eternity*, and Malik Toms, an author and educator who has written for a number of roleplaying games, including *Shadowrun 6th Edition*.

We are excited to continue experimenting with the series—in upcoming episodes, we will discuss games that tackle themes ranging from astrobiology, automation, and the gig economy to the legacy of colonialism.

[youtube.com/imagineASU](https://youtube.com/imagineASU) 

### Imaginary Papers

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Imaginary Papers is a quarterly newsletter about science fiction worldbuilding, futures thinking, and the unplumbed depths of the imagination. Each issue features brief, incisive pieces of writing from a diverse array of contributors, from scholars and journalists to cultural critics, designers, technologists, poets, and more.

The newsletter is an effort to bring some of the simultaneously critical and playful thinking we do about popular culture in our events and public programming to a broader, more nationally and globally distributed audience.

Each issue features three sections:

- Forgotten Futures, highlighting a vision of the future that is unjustly forgotten, or deserves more attention
- Science Fiction Frames, providing insights and analysis that jump off from a single frame of a film, TV show, video game, or graphic novel
- Imagination Elsewhere, celebrating the work of our colleagues, friends, and fellow travelers in the fields of imagination, possible futures, and science fiction

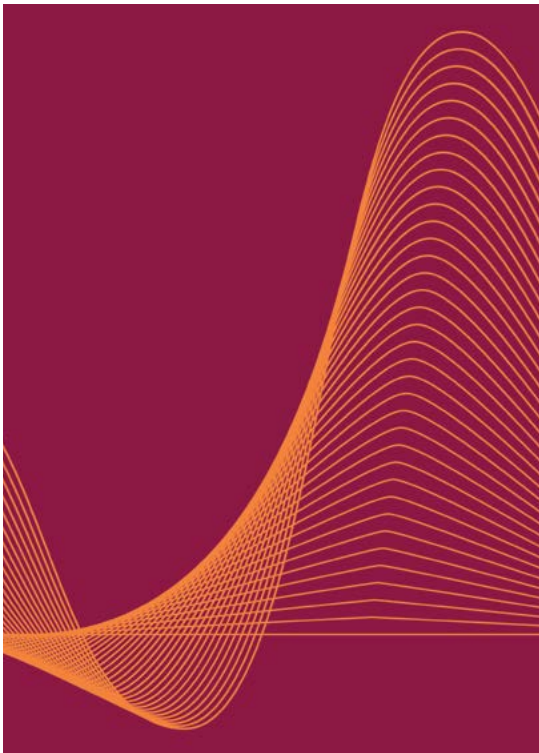
This year, we published our first two issues:

#### Issue 1, January 2020

Alvaro Zinos-Amaro on Michael Marshall Smith's *Only Forward* (1994); Torie Bosch on the television series *The Handmaid's Tale* (2017-present); and Joey Eschrich on The First People's Climate Network (2020)

#### Issue 2, April 2020

Indrapramit Das on the film *The Congress* (2013) and its source material, Stanislaw Lem's *The Futurological Congress* (1971); Jessie Rack on the film *The Descent* (2005); Joey Eschrich on the anthology *Palestine + 100* (2019), edited by Basma Ghalayini







## The Imagination Desk

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Whether we're embarking on a new fiction project, pulling together public events, or hosting visiting scholars, we're often privy to deep conversations with fascinating collaborators. As part of our continuing work to understand, measure, and foster imagination, we've found it instructive to learn from these people about their skills, passions, and creative processes, and to discover how imagination plays a role across different disciplines and areas of expertise.

In an effort to share our thinking and methods with a broad audience, we've collected these recordings into CSI's first podcast series, The Imagination Desk. Produced by CSI's Bob Beard and Dani Pogue and hosted by Joey Eschrich, the first season features interviews with writers, scholars, and musicians about their work and the various tools they use to get into an imaginative space.

### The Imagination Desk, Season 1

**Episode 1:** Television writer and producer Anne Cofell Saunders

**Episode 2:** Fiction author and game designer Matt Derby

**Episode 3:** Transmedia designer and fiction author Maureen McHugh

**Episode 4:** Novelist Paolo Bacigalupi

**Episode 5:** Journalist, critic, and musician Claire L. Evans and the band YACHT

**Episode 6:** Rhetorician, memoirist, and cultural theorist Jonathan Alexander

The Imagination Desk is available wherever fine pods are cast.

[csi.asu.edu/podcast](http://csi.asu.edu/podcast) 



## Networks of Imagination

### Veterans Imagination Project

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Veteran Vision Project courtesy of Devin Mitchell  
[vetengagement.asu.edu/veteran-vision-project](http://vetengagement.asu.edu/veteran-vision-project)

Over the past year, CSI has continued to shape our methods to meet the needs of military veterans. In cooperation with ASU's Office for Veteran and Military Academic Engagement, the Pat Tillman Veterans Center, the Arizona Library Association, and Huts for Vets, a nonprofit organization based in Colorado, we have begun to integrate future-visioning activities and practices of imagination into humanities-based interventions for the veteran community. Findings from these pilot workshops will inform the curriculum for our own programming, as well as forthcoming research on the future of work and applied imagination.

## Flights of Imagination

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Looking to catch up on various goings-on at CSI and find a new bit of internet arcana to obsess over? Look no further than our Flights of Imagination newsletter. Delivered to email inboxes twice monthly, this dispatch features project updates, news, and offbeat cultural recommendations from the CSI staff. Sharp-witted and succinct, Flights of Imagination provides a glimpse into the creative alchemy that powers our work and serves as an entry point for new collaborators and curious members of the public. Subscribe at [csi.asu.edu](http://csi.asu.edu). 





# ClimateWorks Fiction Event

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On June 9, 2020, we teamed up with the ClimateWorks Foundation—an organization headquartered in San Francisco that amplifies the power of philanthropy to confront the climate crisis—to present “Can speculative fiction help us prepare for the future?” a virtual event moderated by CSI director Ed Finn. The event was part of the ClimateWorks 2050 Today initiative, which explores strategies we can pursue today to decarbonize the global economy by the middle of the twenty-first century and avoid the most catastrophic impacts of climate change.

Our special guest speakers were:

Brenda Cooper, writer, futurist, and technology professional, and Endeavor Award-winning author of novels including *Keepers*, *POST*, and *Spear of Light*

Chinelo Onwualu, speculative fiction author, nonfiction editor of *Anathema Magazine*, and cofounder of *Omenana*, a magazine of African speculative fiction

Kim Stanley Robinson, Hugo, Nebula, and Locus Award-winning author of more than 20 novels, including *Red Moon*, the Mars Trilogy, *Green Earth*, and *New York 2140*

During the event, we explored connections between literature and climate policy and discussed how fiction can help us cope with uncertainty and hardship, how the climate crisis intersects with other crises, the kinds of research and preparation that go into crafting a compelling climate story, and what stories and perspectives are still missing from the climate fiction genre, as the crisis deepens and public awareness continues to grow.

## Applied Imagination Workshop in Tokyo

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Building on work developed in early 2019, CSI was invited to present a workshop on imagination at the Thunderbird School of Global Management alumni reunion in Tokyo, Japan. During this two-hour session in September 2019, Bob Beard led a group of 200 international business leaders through a series of activities that asked them to thoughtfully critique existing visions of the future, then collaboratively build their own visions while contending with world-shaping and unpredictable forces like climate chaos, population fluctuations, and technological change.

In addition to introducing CSI to a large, international business cohort, this visit also gave us the opportunity to develop training modules around collaborative imagination, worldbuilding, and technically grounded scenarios that can be adapted for a multitude of audiences and enterprises. We look forward to using these modules with other groups of leaders, workers, decision-makers, and practitioners in the future.

CSI's Bob Beard guides a collaborative group through an exercise to create a speculative future timeline.





## Networks of Imagination



Top: Participants in the Applied Imagination Workshop annotate an image of a future city, asking critical questions about this vision of the future. Bottom: Bob Beard introduces CSI and our methods to workshop attendees.

## July

Bob Beard joins a delegation of ASU-based military veterans to attend Huts For Vets, a wilderness-based therapy program in Aspen, Colorado, with the goal of designing a similar program in Arizona. The program uses a combination of philosophy, literature, and eco-psychology.

## August

Ruth Wylie presents work on CSI's methodologies at a workshop, "Pedagogical Approaches to Building Futures Literacy," organized by our ASU colleague Cynthia Selin.

Bob Beard speaks to incoming student veterans at ASU's Tempe, Downtown, and West campuses as part of the university's New Student Veteran Welcome events.

## September

Ruth Wylie, Joey Eschrich, and Nina Miller present our *Frankenbook* project to the Arizona Academic Decathlon Coaches' Clinic, offering it as an interactive resource for participants to build knowledge and understanding around *Frankenstein*, the selected literary focus for the 2019-2020 season.

CSI hosts the UbiCoS grant research team and advisory board for its two-day retreat to discuss recent findings and plans for the upcoming year.

## October

In partnership with ASU's Institute for Humanities Research, School of International Letters and Cultures, and School of Transborder Studies, CSI hosts Frederick Luis Aldama, a leading scholar of Latinx visual narrative, to discuss identity, representation, and storytelling across new and emerging media platforms.

Adam Nemett, a novelist, filmmaker, and creative director at The Story Factory, visits to deliver a lecture, "We Can Save Us All: Building and Fixing Worlds Through Narrative," as part of the Digital Culture Speaker Series.

Rebecca Wilbanks, a postdoctoral fellow and lecturer at Johns Hopkins University, visits to deliver a lecture, "Science Fiction, Communities of Practice and the Origins of Synthetic Biology," as part of the Innovations Talk series.

Julia Grillmayr, a postdoctoral researcher at the University of Art and Design in Linz, Austria, visits to conduct research for her project on scenario thinking methods.

## November

Ruth Wylie is an invited speaker at the Intergenerational Futures workshop in Kyoto, Japan, and presents work on our new imagination framework and methodologies for interdisciplinary collaboration.

## December

Claire L. Evans, Jona Becholt, and Rob Kieswetter, members of the band YACHT, visit to lead a conversation about their new album *Chain Tripping*, which was created in collaboration with AI systems.

Ruth Wylie is an invited speaker at Stanford d.school's Minds and Meals lecture series. While in the area, she also talks to young girls at Castilleja School for Girls in Palo Alto about careers in STEM and research.



Claire L. Evans discusses how she and her band YACHT worked with AI systems on their album *Chain Tripping*.

# 2019

# 2020

## January

Marlon James, National Book Award finalist and Man Booker Prize winner, visits for "Reclaiming the Fantasy Novel," a dialog with CSI's Michael Bennett about James's new novel *Black Leopard, Red Wolf*, hosted by the Arizona Center for Medieval and Renaissance Studies, the Virginia G. Piper Center for Creative Writing, and CSI.

CSI hosts researchers from the University of Tsukuba and Mitsubishi Research Institute to discuss possible collaborations around the future of work.

## February

Joey Eschrich delivers a guest lecture about climate fiction in "Our Future As Told in Sci-Fi and Cli-Fi," a course at the University of Washington-Bothell taught by Miriam Bertram and LuAnne Thompson that uses short stories from CSI's *Everything Change* anthologies.

Bob Beard hosts a session showcasing writing from local military veteran authors at the Desert Nights, Rising Stars Conference, presented by ASU's Virginia G. Piper Center for Creative Writing.

## March

Deena Gould and Ruth Wylie present a lightning talk at ASU's virtual Social Embeddedness Conference titled "Trust in the Imagination: Community-Embedded Scholarship to Engage Multiple and Diverse Publics with Science-in-Society Issues."

## April

Ruth Wylie participates in a virtual panel organized by the Mary Lou Fulton Teachers College and the University Design Institute on the future of education and the role of universities in the post-truth era.

Joey Eschrich speaks as part of a virtual panel about our *Future Tense Fiction* anthology, hosted by the Battelle Center for Science, Engineering, and Public Policy at The Ohio State University.

Ed Finn joins "When Crises Unleash Your Imagination," a conversation with editor Torie Bosch, part of the Social Distancing Socials series hosted by Future Tense.

## May

CSI (virtually) hosts members of the Frankenstein200 advisory board to discuss the research outcomes of our NSF-funded project and explore new methods for designing and deploying transmedia learning environments in the future.



Members of the Frankenstein200 advisory board show off their monster puppets.

## June

Deena Gould and Tyler Eglen present a module at the Mary Lou Fulton Teachers College's STEM Camp 2020, designed to train middle school science teachers in how to deepen inquiry and build language skills through narrative role-play.

Andrew Hudson joins "Optimism & The Futures Of Sci-Fi Worlds," a panel at the virtual science fiction convention LockDownCon, along with writers, producers, and science advisors from TV series including *Star Trek: The Next Generation*, *Cosmos*, and *Jessica Jones*.

## Visits and Visitors

# Imaginative Resilience

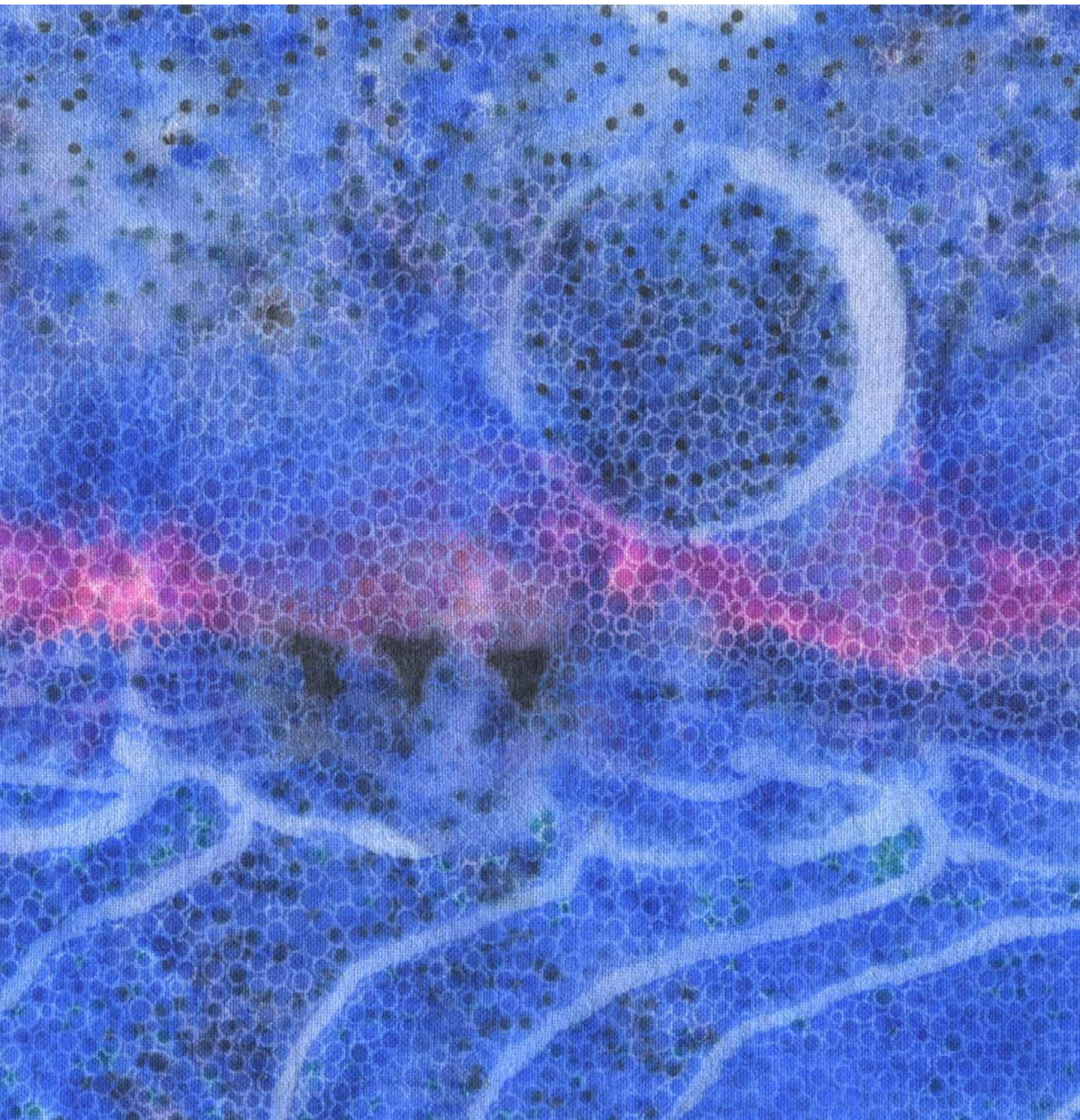
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How can we navigate complex challenges, adapt to new tools and practices, and imagine solutions to impossible problems?

Art by Nina Miller, to accompany Chinelo Onwualu's story  
"When We Call a Place Home."









# Us in Flux

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Understanding, anticipating, and responding to change is at the heart of science fiction: envisioning ourselves amid the strange and the fantastic attunes us to the unexpected and helps us chart a course to a better future. This notion has guided our work at CSI since our founding in 2012, and it suddenly became even more salient as the outbreak of COVID-19 rushed into the global consciousness.

In April 2020, as a response to the turbulence and uncertainty of the pandemic, we launched *Us in Flux*, a series of flash fiction stories and virtual events about community, collaboration, and collective imagination in the face of transformative change. Organized and edited by Joey Eschrich and Bob Beard, with stunning textile-based artistic accompaniment by Nina Miller, *Us in Flux* invited talented authors, scholars, and creators of all stripes to give us glimpses of new worlds, of people and systems in transition, and of the different ways we might flourish in times of adversity.

Stories were published for free on the CSI website and were followed by live, online conversations with our fiction authors and a wide range of special guests to delve deeper into these fictional worlds, and to help us make sense of our own.

[csi.asu.edu/usinflux](https://csi.asu.edu/usinflux) 



Art by Nina Miller, to accompany Tochi Onyebuchi's story "A Room of One's Own."



Art by Nina Miller, to accompany Sarah Pinsker's story "Notice."

## Imaginative Resilience

### **“The Parable of the Tares”**

**by Christopher Rowe**

Us in Flux: Conversations – Food, Farming, and the Future, with Christopher Rowe and agroecologist Michael Bell

### **“An Attempt at Exhausting My Deck”**

**by Kij Johnson**

Us in Flux: Conversations – Ecology, Naturalism, and Communities, with Kij Johnson and ecologist Jessie Rack

### **“When We Call a Place Home”**

**by Chinelo Onwualu**

Us in Flux: Conversations – Utopias and Applied Imagination, with Chinelo Onwualu and conflict journalist Robert Evans

### **“A Room of One’s Own”**

**by Tochi Onyebuchi**

Us in Flux: Conversations – Thriving in the Multiverse, with Tochi Onyebuchi and technoculture scholar Michael G. Bennett

### **“Skating Without Streetlights”**

**by Tina Connolly**

Us in Flux Conversations – VR for Connection and Community, with Tina Connolly and virtual reality developer Dennis Bonilla

### **“Fourth and Most Important”**

**by Nisi Shawl**

Us in Flux Conversations – Speculative Fiction + Real-World Action, with Nisi Shawl and organizer/educator Ayana Jamieson

### **“Notice”**

**by Sarah Pinsker**

Us in Flux: Conversations – Observation, Learning, and Choice with Sarah Pinsker and education scholar Punya Mishra

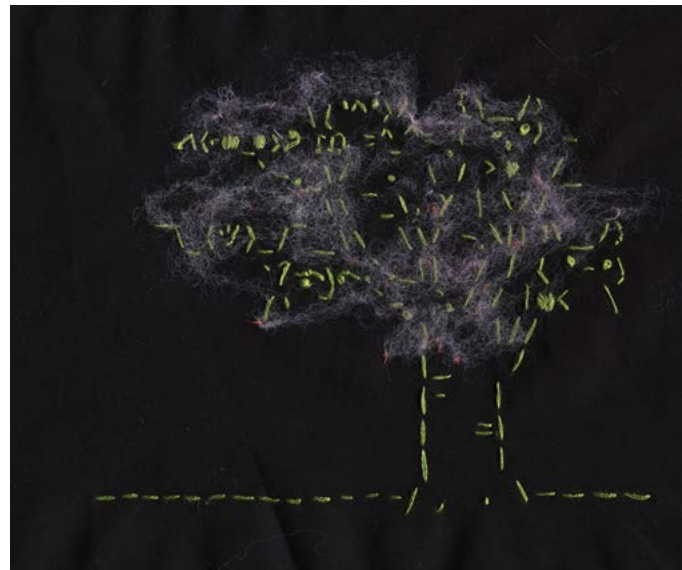
### **“A Cyber-Cuscuta Manifesto”**

**by Regina Kanyu Wang**

Us in Flux: Conversations – Memes, Symbiosis, and the Microbiome with Regina Kanyu Wang and psychology scholar Athena Aktipis



Art by Nina Miller, to accompany Nisi Shawl’s story “Fourth and Most Important.”



Art by Nina Miller, to accompany Regina Kanyu Wang’s story “A Cyber-Cuscuta Manifesto.”



## COVID-19 Cancellations and Ways Forward

**One key facet of imaginative resilience is our ability and willingness to adapt in times of sudden, unexpected change.** Several major in-person projects and collaborations that we were excited about had to be canceled or postponed in the face of the mounting COVID-19 crisis. We look forward to addressing these themes and ideas in future projects, either by rescheduling and reworking these engagements for some kind of post-crisis era, or by finding new avenues to explore them.



## Future of Childhood Summit

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Our first event to be canceled due to COVID-19 was the Future of Childhood Summit in San Francisco. Ed Finn and Ruth Wylie were planning to attend the event, which would have brought leaders from a variety of sectors together to create an aspirational but achievable vision of the future, one in which all children's interactions with media and technology enrich—rather than diminish—their learning, well-being, and safety. CSI had also planned a panel discussion with high school students from Latitude High School in Oakland, California to discuss how they imagine positive futures for childhood, and what we need to do to get there.

## Collaborative Book Salon

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Before COVID-19 derailed our plans, we were excited to collaborate with the Comparative and International Education Society to conduct a Collaborative Book Salon at their 2020 conference in Miami, Florida. Running parallel to the conference's traditional tracks of panels and workshops, each session of the salon would convene a small group of contributors—researchers, artists, education practitioners, and others—to participate in an intense bout of conversation and writing. Each session would tackle a big question related to the conference theme “Education Beyond the Human,” harnessing the energy and verve of a series of intellectual exchanges about what forms education, research, and scholarly publications could take in our more-than-human world.

Each big question was connected to the meeting's plenary panels and offered an opportunity to delve deeper into collaborative thinking and intellectual exchange. Sessions would begin with a facilitated conversation among participants, followed by designated time for each participant to reflect and compose a piece of writing or art inspired by the conversation. Within 72 hours (and by the end of the conference), our aim was to collaboratively publish an e-book, which would be available for free to all conference participants and to the public.

# AI and Humanities Workshop

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Imaginary College fellow Suren Jayasuriya was awarded a grant from the National Endowment for the Humanities to explore how to prepare humanities and arts students for a rapidly shifting technological landscape shaped by artificial intelligence, machine learning, and data science. Suren and co-investigator Ed Finn had planned to conduct a series of workshops and discussions in the spring of 2020 under the title *Technological Hope and Anxiety: Artificial Intelligence in Digital Culture*. These gatherings would provide foundational resources and ideas for the development of a new certificate program in the Digital Culture program at the School of Arts, Media and Engineering. Unfortunately, we had to alter those plans, and the project team is now planning virtual activities for late summer and fall 2020. Activities at these small-group gatherings will include panel discussions, curriculum/pedagogy brainstorming and development, and dialog at the intersection of digital humanities, literature, philosophy, media arts, and the computing sciences.



NATIONAL  
ENDOWMENT  
FOR THE  
HUMANITIES

This research on AI and humanities is funded by the National Endowment for the Humanities under Grant No. AKA-265705-19.

## Emerge Preparation

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As Arizona started to shut down in March, the School for the Future of Innovation in Society was about to launch ASU's *Emerge 2020* festival. Nina Miller and Venkatesh Lakshmi Narayanan, our design team, put together a visual framework for the theme of *Eating at the Edges* by playing extensively with their food.

[emerge.asu.edu](https://emerge.asu.edu) 

## Imaginative Resilience



# Future of Learning

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How can we light the spark of imagination  
to create new opportunities for collaborative,  
creative learning?

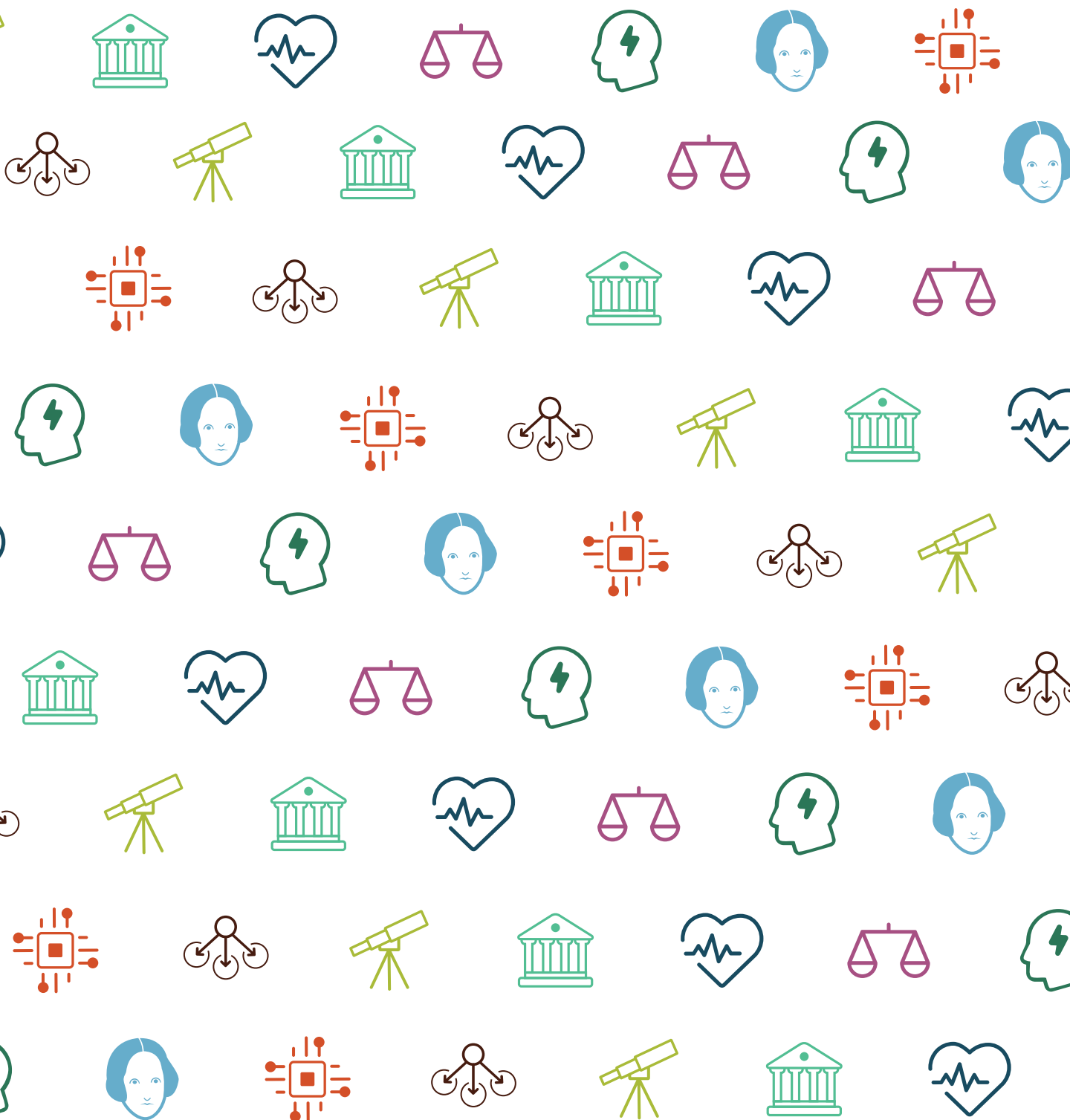
Students from Phoenix Country Day School visit CSI to  
learn different ways to think about the future.





## Center for Science and Imagination





# Frankenbook

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This spring, the *Frankenbook* project welcomed graduate research assistant Zeinab Serhan to begin developing curriculum materials for wider adoption of our digital annotated edition of *Frankenstein* in classrooms and informal settings. Working with the CSI team and our collaborators at The MIT Press, Zeinab assessed how users have been engaging with the *Frankenbook* site. She also surveyed courses and instructors who have assigned *Frankenstein* at ASU and beyond, and developed plans for a workshop to gather input from teachers on how best to support teaching with *Frankenbook*. These efforts will provide critical groundwork for our teacher in residence Tyler Eglen, who will take up Zeinab's work and complete the development of teaching resources in late summer 2020.

We were excited to learn that *Frankenstein* was selected as the main literature work for Academic Decathlon for the 2019-2020 academic year. This allowed us to share *Frankenbook* with a new group of educators and high school students. CSI's Ruth Wylie, Joey Eschrich, and Nina Miller gave a demonstration of *Frankenbook* at an Arizona Academic Decathlon event on ASU's Tempe campus in September 2019, helping coaches explore the possibility of using our interactive online edition with their teams.

# Grand Challenges Engineering

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ASU's Fulton Grand Challenge Scholars program, part of an initiative from the National Academy of Engineering, combines inventive courses, mentorship, and cutting-edge research experiences to prepare students to solve the most pressing challenges facing society. CSI runs in-class science fiction exercises for first-year Grand Challenge Scholars in the fall and spring semesters, helping students grapple with the social, cultural, and psychological implications of their applied technology projects by creating their own narratives about the future. 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 technological innovation and introduce tools for brainstorming and low-fidelity prototyping.

This year, CSI also created a virtual version of our science fiction prototyping lesson for an online Grand Challenges course. The course is offered to participants in ASU's Earned Admissions program, which provides students with a clear path into college, no matter their backgrounds or previous academic performance. In addition to our virtual lesson, the online course features fiction and nonfiction about clean-energy transitions from our book *The Weight of Light*, as part of a unit on sustainability and engineering.

Joey Eschrich gives a presentation about science fiction tools for prototyping at the Grand Challenge summer program.





## Future of Learning





# Phoenix Country Day School Emerge Pilot

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In February, we hosted 65 sixth-grade students for hands-on imagination and futures activities. Working in small teams, students began by playing the card game *The Thing from the Future*. This imagination game encourages players to create hypothetical future objects that delight and inspire. Next, students continued to ponder their desired futures by completing *Recipe for the Future* cards, which challenged them to imagine the future of food and create products such as non-allergic powder (a mixture that you add to foods to counteract any allergic reactions), a vibrating plate (a plate that moves to help people with visual impairments locate their plate and know how much food is left), and edible plastics (consumable food containers that reduce waste).

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*The Thing from the Future* by Stuart Candy and Jeff Watson, 2015 is licensed under CC BY-NC-SA [creativecommons.org/licenses/by-nc-sa/2.0](https://creativecommons.org/licenses/by-nc-sa/2.0). Find out more at [situationlab.org](https://situationlab.org).

Ed Finn leads students from Phoenix Country Day School in a discussion about the future of food.



# Ubiquitous Collaboration Support (UbiCoS)

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CSI's Ruth Wylie is collaborating with Erin Walker of the University of Pittsburgh on a National Science Foundation-funded project aimed at improving middle school students' help-giving skills. Previous research shows that students benefit cognitively and emotionally when they help one another with learning and schoolwork; however, they often need support to learn the best ways to provide that help. We're developing a new technology, Ubiquitous Collaboration Support (UbiCoS), which tracks help-giving across multiple tasks and automatically provides support.

The UbiCoS collaboration continued in its second year, with new collaborators Adam Clark and Stefania Metzger, both graduate students in the Mary Lou Fulton Teachers College, joining the project. CSI hosted an advisory board visit in September 2019, bringing together team members from ASU and the University of Pittsburgh with our four advisory board members.

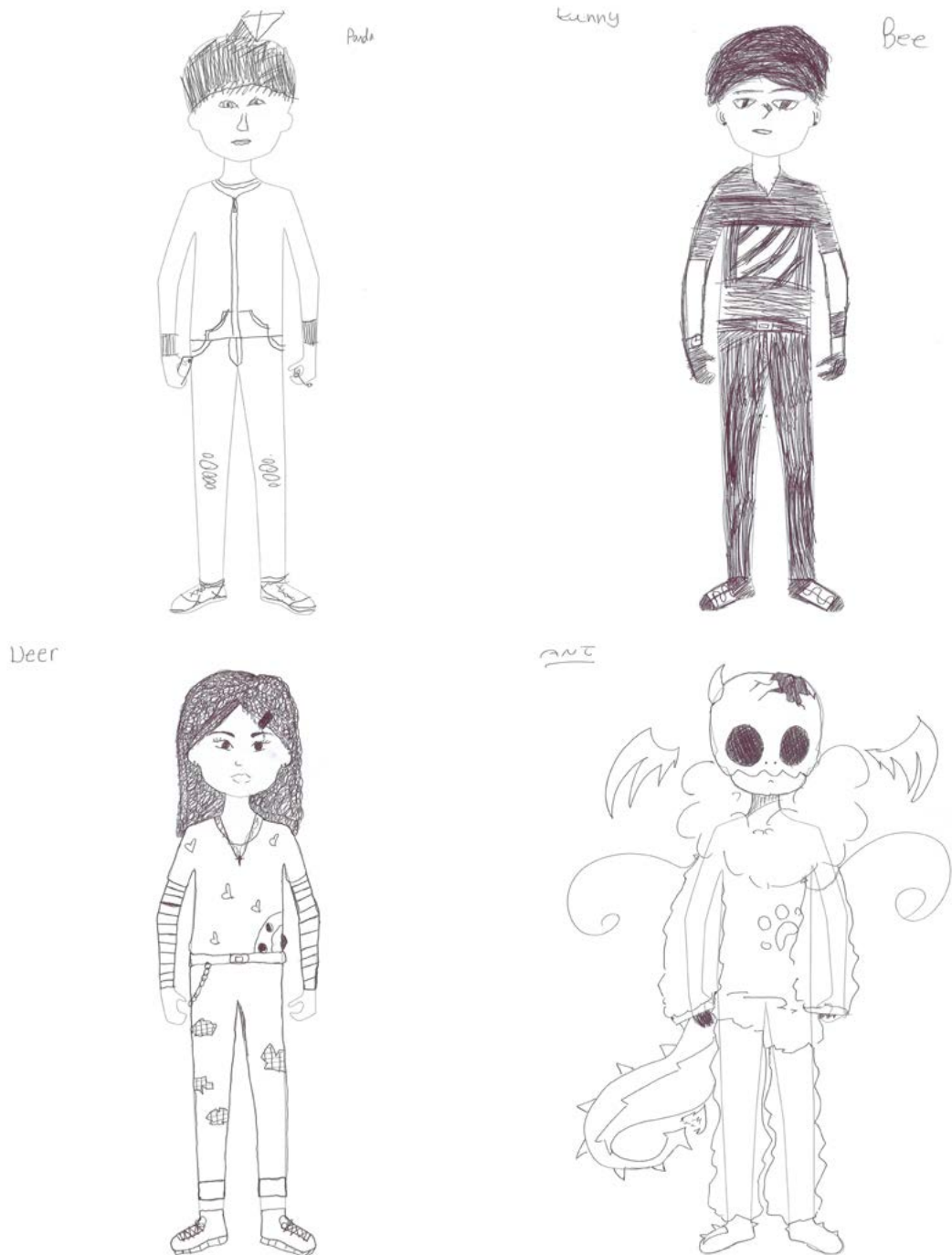
While COVID-19 derailed our classroom data collection plans, we were able to complete a series of co-design sessions with local middle school students. The goal of these sessions was to work with students to better understand and interpret the data we collected in the spring of 2019. This process involved teaching the students the principles of qualitative analysis, collaboratively coding data, and finally, comparing the student results with those from the research team. An article describing our co-research methodology and results is under review for publication in a peer-reviewed journal.



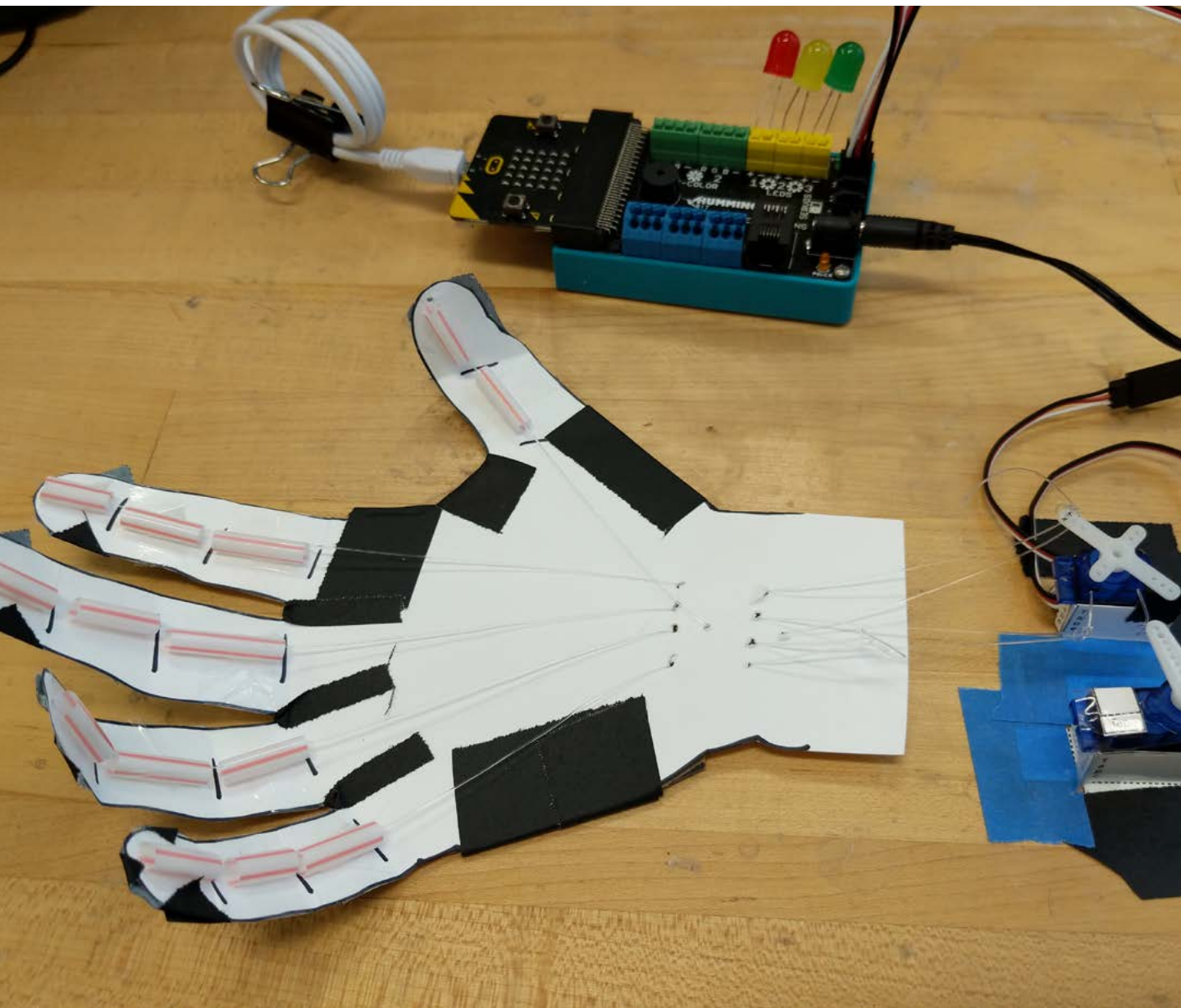
This research is funded by the National Science Foundation under Grant No. 1912044.



# Future of Learning



User persona drawings created by student participants in the UbiCoS co-design session.



A programmable hand created as part of the Frankenstein201 coding and making curriculum.

# Frankenstein200 Progress

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How can Mary Shelley's tale of scientific creativity and responsibility help us prepare for the next 200 years?



This research is funded by the National Science Foundation under Grant No. 1516684

# Preschool Robotics Curriculum

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This year, CSI's Deena Gould worked in partnership with teachers at Mesa Public Schools to design and implement a series of lessons for preschool students to learn about robotics and the future. In these lessons, the students compared robots, programmed robots, and created stories with robots. Students became inventors who imagined robots that could fly, cook, stomp, dance, hug, and assemble themselves into a variety of configurations to rescue people in need. The students pondered, imagined, and discussed how their robot creations might affect the world, in both positive and negative ways. Through these lessons, students learned about biomimicry, science-in-society, and computational thinking. They engaged in imaginative play and applied their emerging language and literacy skills. These integrated STEM lessons will be shared with teachers in an upcoming technology-themed issue of the National Science Teaching Association's journal for elementary school teachers, *Science and Children*.

Students in the Mesa Public Schools explore the behavior of a robotic bee.





# Frankenstein200 in Schools

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For our Frankenstein200 in Schools project, CSI's teachers in residence Tyler Eglen and Deena Gould created curriculum materials for middle school classrooms, designed to engage students with science-in-society issues by having them participate in hands-on activities and explore online media content from our Frankenstein200 project.

The curriculum started with an activity that had been quite successful during the initial Frankenstein200 rollout in museums and science centers: the Scribblebot, a simple automaton with markers for feet that moves and draws on paper and other surfaces. Our team built a lesson plan around the Scribblebot activity that was implemented over three days at multiple elementary schools in the Mesa Public Schools district. We built on the 5e model for lesson planning, which prompts learners to engage, explore, explain, elaborate, and evaluate, adding a sixth “e,” empathize, to further strengthen students’ ability to take on diverse perspectives that differ from their own.

In this lesson, students are taught about gene editing and chromosomes prior to designing their own Scribblebot. Each craft material they add to their bot (feathers, pipe cleaners, etc.) corresponds to an expressed trait that was preassigned, like the ability to grip objects or fly. Students then explain to their classmates which traits they chose and why.

Then, students watch a 10-minute video version of the Frankenstein transmedia storyline. This truncated version of the storyline focuses on the ethical dilemmas encountered by Mya, one of the research assistants in the fictional bioengineering lab, and aims to deepen the students’ engagement with responsible and ethical science practices. Students are then asked to role-play from one of three perspectives: Mya, the research assistant and, as it turns out, a bioengineered being; Dr. Tori Frankenstein, the head of the lab and Mya’s creator; or an onlooker, providing a perspective from outside of the lab as a member of the public.

We have submitted the lesson and teacher guide to Science Scope, a publication of the National Science Teaching Association focused on middle school education. Additionally, the project was accepted for exhibition at the Science and Technology Expo, a public convening also hosted by the National Science Teaching Association.

Scribblebots with an array of unique traits created as part of our Frankenstein200 in Schools curriculum.







CSI's Tyler Eglén demonstrates how to create and program an artificial hand.



# Frankenstein Coding and Making

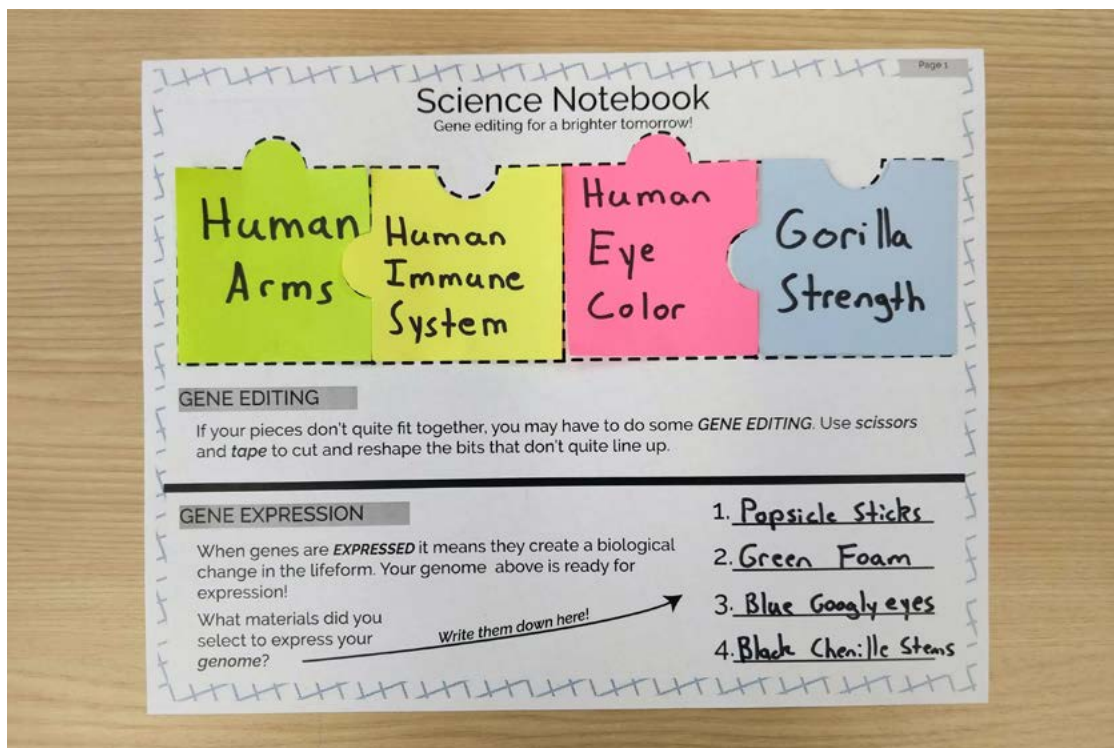
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To further extend our Frankenstein200 work—specifically our Frankenstein’s Footlocker hands-on activities—and make them available to broader audiences, we created a set of coding and making activities for afterschool and STEM clubs, which we’ve called Frankenstein201. We designed these to introduce students to physical making and coding skills through the easily approachable lens of science fiction storytelling.

This curriculum borrows from a series of earlier Frankenstein200 activities that invited participants to create creatures and bring them to life with lights, simple machines, and electronics, but reimagines them to integrate with an entry-level microcontroller that enables learners to connect their physical artifacts to a computer program of their own design. The block-based coding environment SNAP! allows learners to create their own animated stories and bring their creations to life.

In the afterschool club we used to test the curriculum, students used the Frankenstein story as inspiration to invent a new creature that would light up when activated, move a body part (a hand, tail, claw, wing, etc.), and even produce speech by moving its mouth while simultaneously producing sound, according to its coding. Participants learned about artificial intelligence, coding, physical prototyping, and the principles of responsible making.

All of the lessons have been converted to an online video series that is available on CSI’s Teacher Resources page. There, club leaders, teachers, and students are able to access the material at their own pace, and adapt it for their own needs and setting. The Frankenstein201 project was also accepted for demonstration at the FabLearn 2020 conference on maker culture and education.



## Pre-Service Teacher Training

This year, CSI worked with faculty in ASU's Mary Lou Fulton Teachers College to design and implement a series of lessons for pre-service teachers to learn about science-in-society topics and how to explore these issues with students. Using media, tools, and design principles from our Frankenstein200 transmedia project, we developed in-person lessons for the fall of 2019 and online lessons for the spring of 2020.

Using a narrative inspired by Mary Shelley's *Frankenstein* and affordable hands-on STEM materials, these lessons supported pre-service

teachers in role-playing different perspectives around the topic of genome editing. The lessons also helped pre-service teachers develop knowledge and confidence to take the lead in discussing scientific and ethical issues with each other and with ASU researchers. To assess the effectiveness of these lessons, we are using a mixed-methods approach that includes self-efficacy assessments and discourse analysis.

### Frankenstein200 Research

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We have been preparing manuscripts for academic journals using the data collected throughout our Frankenstein Bicentennial Project activities over the last several years. Most of these papers are based on our studies in K-8 classrooms, and examine the impact of the Frankenstein200 transmedia experience on learners' science self-efficacy, creativity, science identity, and science curiosity, as well as their understanding of science ethics. Our findings have a variety of potential implications for scholarship in the learning sciences, about the potential benefits and drawbacks of transmedia storytelling experiences. They may also help educators design and run their own transmedia storytelling projects.

Another paper presents findings from our studies in museums and science centers. Results from this research suggest that story-driven learning experiences like Frankenstein200 can help learners develop skills related to scientific creativity and innovation, acquire knowledge related to STEM and responsibility, and engage in scientific conversations.

We also wrote about the educational affordances of hands-on and digital activities, learners' science interest, and moral development in conjunction with the Frankenstein story. These papers are currently under review at various academic outlets. Results from these studies may help educators and researchers design, implement, and evaluate technology-mediated science and science ethics activities for K-8 students.

In 2020, we attended the virtual International Conference of the Learning Sciences, where we presented a paper about research on digital narrative-based learning and a poster on how transmedia tools can be used to foster the development of science identity. We were also planning to attend the Connected Learning Summit 2020, but it was canceled due to the COVID-19 crisis. Our paper on narrative-based hands-on activities will be available online at the conference website.

[connectedlearningsummit.org](https://connectedlearningsummit.org) 

# Looking Ahead

The year ahead will be filled with new opportunities for research, collaboration, learning, and bringing people together, as we all navigate a world in flux. Here are a few projects on the horizon that we're especially excited about.

## Leonardo Imagination Fellowship

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Starting in the fall of 2020, CSI will be partnering with Leonardo, The International Society for the Arts, Sciences and Technology, in creating a new fellowship program for scholars, artists, and practitioners from underrepresented and marginalized groups. Fellows selected to participate in the virtual program will explore experimental art-science innovation practices that imagine a regenerative, vibrant global future for all.

Fellows will propose and carry out hybrid creative projects and activities that integrate art and science for positive global impact, spanning local to planetary scope, aligned with the United Nations Sustainable Development Goals (SDGs). We will support experimental work that models how art-science can advance resilience, empathy, cooperation, generosity, trust, and other qualities that make social systems and digital culture more human and more humane. The inaugural Fellowship Program will offer up to three virtual fellowships for a duration of eight weeks.

These fellowships aim to support diversity and inclusiveness in art-science creative practice and scholarly inquiry, and to amplify the voices of underrepresented talent, including but not limited to people overcoming or living with experiences of forced migration, exile, systemic racism, incarceration, discrimination, disability, marginalization, and other vulnerable circumstances. Priority consideration will be given to fellowships promoting social justice, antiracism, and equity through humanizing social systems and digital culture. Learn more at [www.leonardo.info](http://www.leonardo.info), or contact us at [imagination@asu.edu](mailto:imagination@asu.edu).



## Imagination Field-Building

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As we approach the tenth anniversary of CSI's founding, we are looking forward to the next stage in our intellectual trajectory. CSI's work has been praised and emulated in many places around the world, but we believe there is more work to do in raising awareness about imagination itself as a critical resource for navigating the challenges before us. Over the next year, we will begin to conduct a series of dialogs with experts in imagination from many different perspectives: scientists and scholars, artists and writers, activists and community leaders. We will begin establishing a critical framing of imagination as a fundamental human capacity for anticipation, empathy, and empowerment that spans cognitive science, aesthetics, performance, and other fields. We hope to cultivate a global conversation about imagination as the ignition system for resilience, creativity, and care, and we look forward to learning from diverse communities of thought and practice.

## Imagination Workshops

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We are excited to bring our interdisciplinary imagination methods to new audiences, and to better understand how our approaches might be useful to people catalyzing change or rethinking their fields, areas of practice, or organizations. We have begun exploring collaborations with nonprofit and government groups, including the Smithsonian Institution and N Square (an innovation network aimed at reducing nuclear threat), to offer opportunities for professional development and community-building that invite people to explore possible futures through speculative fiction storytelling, worldbuilding, and collaborative imagination. These partnerships will enable us to refine our methods, and to increase the impact of our work by sharing knowledge with folks on the front lines of social change and institutional reinvention.



## You can change the future!

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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.

### **[csi.asu.edu/donate](https://csi.asu.edu/donate)**

All funds will be deposited with the ASU Foundation for A New American University, a nonprofit 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.

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
- Welcome new and underrepresented 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!**

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Students from Phoenix Country Day School participate in a workshop at CSI.

# Center for Science and Imagination

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