STEAM FACTORY

2019 – 2020 Annual Report

November 2020

Section I

Overview

A. Our Vision

Together, we can shape the university of the future!

A university that blends expertise, knowledge, and insight from all academic disciplines will address society's increasingly complex needs. It fosters curiosity, building the skills and capacity necessary for its faculty, staff, and students to engage in collaborative work that is powerful, rewarding, and transformative enough to encourage expansion beyond academic walls and into the larger community. This university of the future is inclusive and intentional in understanding and valuing diverse backgrounds and perspectives and developing diverse education that brings about a more equitable, sustainable, and just population.

Knowing that innovation and creative problem-solving occurs outside disciplinary silos, STEAM Factory builds and supports a collaborative network that increases meaningful interactions among engaged scholars with diverse backgrounds, talents, and academic expertise. The STEAM Factory nurtures a holistic academic community where scholars can "find their people", enhancing and extending their interconnected scholarship, education, and service efforts. By inviting scholars across all disciplines to bring their whole selves, STEAM creates a unique and vital academic community that disrupts traditional disciplinary ways of thinking and builds a culture of trust, experimentation, agility, and innovation. It is through this culture that our members develop meaningful relationships, build transformative collaborations, and break new ground in all facets of their professional responsibilities while progressing through their chosen career paths.

B. Our Mission

STEAM Factory's mission is to foster a culture of collaboration at Ohio State that supports and sustains diverse academics across their entire careers.

Building a Collaborative Academic Community and Facilitating Research Dissemination: STEAM Factory provides formal and informal programming and a physical space for researchers of all disciplines to broaden their perspectives, build academic community, share research resources and teaching strategies, and forge collaborations. Additionally, through accessible and diverse outreach efforts reaching both children and adults, STEAM Factory both connects with and enriches the Columbus community and amplifies Ohio State scholarship, providing researchers with valuable opportunities to engage with diverse Ohio communities.

C. Our Culture, Our Strength

"When I am on campus, I have a sense of responsibility. When I step into the STEAM Factory, I get a sense of possibility." – Sam White, Associate Professor of History

STEAM Factory is unique across Ohio State and complementary with the university's expansive resources. STEAM was founded by a small group of interested junior faculty looking to find meaningful connections across departments, colleges, and traditional disciplinary silos. Innovative member initiatives make the STEAM Factory a hub for groundbreaking interdisciplinary collaborations and dissemination at Ohio State. Since its founding, STEAM has expanded its membership broadly to welcome current Ohio State faculty, staff, and post-docs from all academic disciplines. Our initiatives are driven by member interest and curiosity and grounded with the knowledge that when experts converge across diverse disciplines, chance

discoveries and serendipities spark new kinds of innovation. Faculty-driven programming in agile and experimental formats, such as STEAM Exchange salon-style seminars, illuminate diverse types of scholarship, hone teaching skills, and deepen service activities while bringing together scholars from disparate disciplines and career stages. Members regularly encounter ideas at the forefront of research and creative expression efforts throughout the arts, humanities, social and behavioral sciences, and traditional STEM research fields.

Strengths of the STEAM Factory:

- **Builds academic community** - STEAM Factory is where our members "find their people"; a common sentiment has been "I wish we had something like STEAM when I was starting out." STEAM was created by and for engaged, diverse, and brilliant academics to holistically connect and support one another in all capacities as both academics and engaged citizens of the planet.
- **Fosters agile collective action around critical and emerging needs** - STEAM is a strong existing university resource whose grassroots nature allows for almost immediate activation of the collective around critical and emerging needs and interests. For example, recent member interest in addressing structural and institutional racism lead to a burgeoning collaboration with the Kirwan Institute (and other university partners) to develop a pilot micro-credentialing program in racial justice for Ohio State faculty and staff.

> *"Faculty and staff take ideas that emerge from STEAM and then engage others across the university in their work, benefiting other faculty, centers, and departments. Faculty at STEAM are more satisfied, taking the pressure off their departments to meet all of their needs, and bringing positive change back to their departments."*
>
> *- Dr. Zoë Plakias,*
> *Assistant Professor, Agricultural, Environmental and Developmental Economics*

- **Enhances academic quality of life** - Members instantly become part of a lively community representing almost every faucet of academic life, further accented by multiple programs specifically created to foster academic and community engagement opportunities each month.
- **Creates a nurturing, substantive, fun and experimental environment** - STEAM Factory members are transforming academia, doing experimental work in breaking down barriers and traditional silos. To allow for such transformative work, STEAM Factory creates a safe, nurturing, lively, fun and supportive environment, an interdisciplinary home within the university, that supports widely diverse academics in vastly different fields to come together and create something new together. Making all programs both substantive and light-hearted is key in helping deepen professional and personal connections.
- **Accelerates network formation for new faculty** - STEAM accelerates onboarding and network building especially for early-career faculty and academics new to Ohio State, along with existing Ohio State scholars eager to expand their connections across disciplines.
- **Broadens perspectives and mentorship support** - The lasting connections built among the membership serve to broaden academic perspectives, provide crucial informal interdisciplinary peer mentoring and support, and enhance recruitment and retention beyond what can be

accomplished through specific research collaborations alone, and they remain salient across scholars' entire career paths.

- **Provides benefits across entire academic career from recruitment to retirement** - Through its initiatives and programs, the STEAM Factory supports diverse scholars from all fields, providing support, academic community, and resources across their entire academic career.
- **Our collective human capital** - STEAM is composed of and driven by dedicated and engaged scholars; member motivation and effort allow us to leverage a small organizational budget for significant impact across the university.

Through initiatives such as STEAM Powered Projects seed funding and a member-focused approach to programming, Ohio State faculty and staff are inspired to experiment and expand beyond the confines of their discipline. This leads to more innovative grant proposals, often with STEAM Letters of Support, that find success by embracing collaboration and pushing boundaries.

D. Our Timeline

STEAM Factory is a grassroots network founded in December 2012 that grew organically out of a meetup group for new faculty in the Columbus area. In 2013, we launched our earliest faculty engagement and public outreach events, with the first STEAM Exchange seminars and research-based outreach for scholars among the artists and vendors during the Franklinton Farmers Markets. These early STEAM efforts were organized solely by early STEAM faculty and were successful in both attracting public audiences and garnering the attention of the University. In December 2013, founding STEAM faculty discovered the opportunity to rent an unrenovated room in 400 W Rich and realized its potential as a co-working and outreach space within a diverse and growing community of artists and innovators in Franklinton. In its first year, the STEAM Factory network grew from 3 faculty members to 27 faculty, researchers, and staff. Members immediately introduced this new academic community to faculty recruitment candidates and university colleagues. STEAM Factory was born from these early grassroots programs, events, and informal meetings.

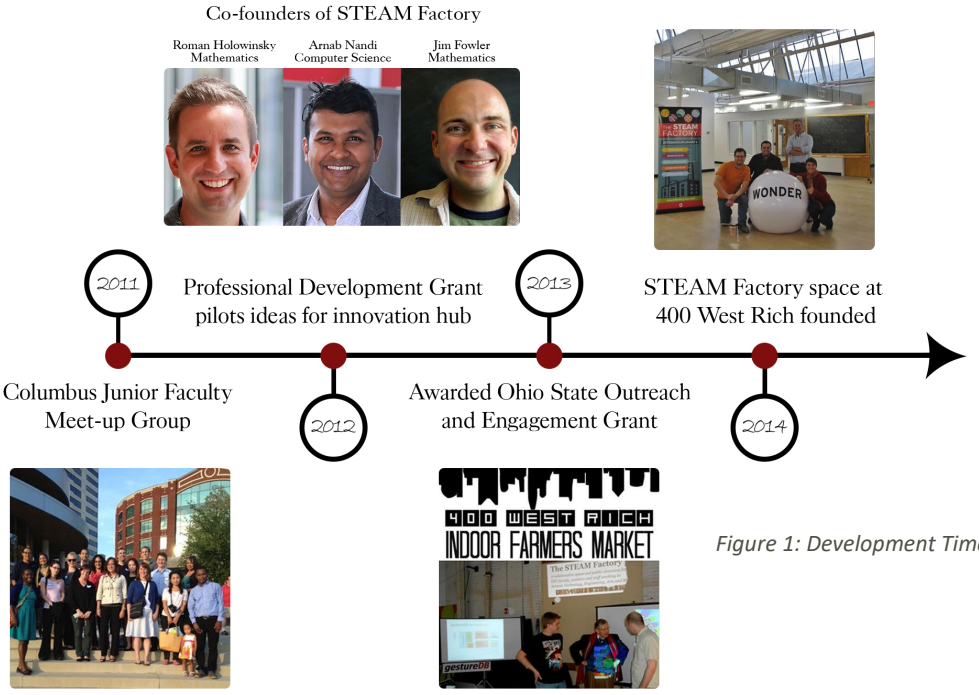


Figure 1: Development Timeline

E. Membership Growth and Distribution

From our humble beginnings, STEAM Factory has grown into the most diverse academic community at The Ohio State University. Membership is open to current faculty, postdoctoral researchers, and staff at The Ohio State University, following a simple application process to determine alignment with STEAM's overall mission and vision. The STEAM Factory space, among the arts and technology innovators at 400 W Rich in Franklinton, is a place for scholars, the creative community, and broader public to engage with one another in an urban, collaborative space in downtown Columbus.

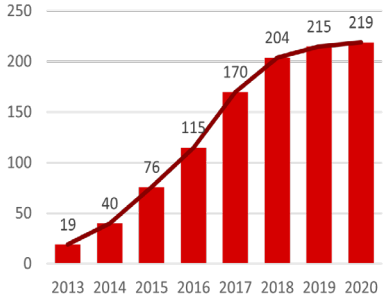


Figure 2: Membership Growth

STEAM Factory has grown from 12 founding members to **219 active members** (Figure 2), representing **65 departments and 34 Centers/Institutes/Programs** at Ohio State. This incredibly diverse and grassroots academic network is a unique model among land grant universities, and it connects scholars across all 13 Colleges (Figure 3). Membership is balanced in terms of gender (**52%** female and **48%** male).

As a cross-section of Ohio State's brightest talent, members have received over 225 awards, grants and honors for excellence in research, teaching, outreach and service. A majority of the faculty membership (**64%**) represent junior tenure-track faculty and over a quarter (26%) are affiliated with a Discovery Theme.

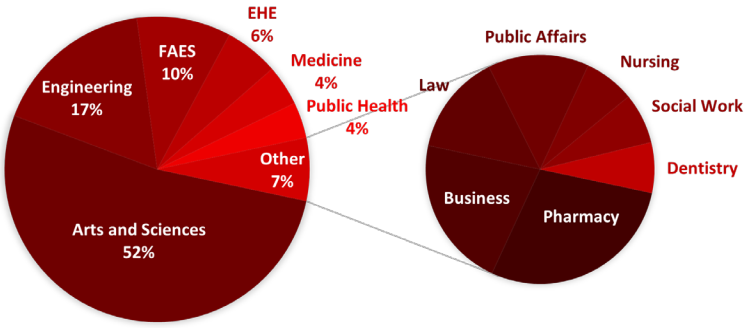


Figure 3: STEAM Factory Membership Distribution by College

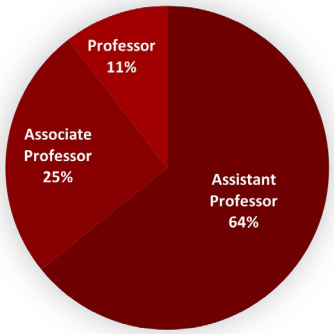


Figure 4: Faculty by Rank

F. How We Work - Developing a network through collective leadership

Creating an environment that enables deep and unconstrained research and engagement calls for new forms of individual and collective leadership. STEAM Factory has a unique and flat organizational structure with programming driven by member interest and initiative. STEAM's most successful programs have arisen from the interest and unfulfilled needs of individuals or groups of members who come together, incubate an idea, open it up to assess group interest, and follow through with program implementation and further experimentation. This agile structure has supported many new faculty-led programs/projects.

Members are actively encouraged and supported in both new and existing research, education, and outreach initiatives. Members may volunteer for existing programmatic Working Groups work alongside the Program Director to develop and organize core activities, such as STEAM Exchanges, and public-facing outreach events like Franklinton Fridays. Members also regularly create ad hoc Working Groups around critical needs (e.g. racial justice movement, summer 2020), grant opportunities and identified interests. STEAM Factory is governed by a democratically elected Executive Leadership Board which oversees and supports programs, activities, and initiatives. This board's Faculty Director serves a rotating two-year term and works closely with the Program Director to maintain operations and relations with funders, administration, and collaborators.

Section II

Our Value: Connection to University Strategic Goals

STEAM Factory plays a unique role within the University that complements other institutional organizations and resources.

STEAM Factory builds vital academic community that disrupts traditional siloed disciplinary ways of thinking and emphasizes and builds a culture of trust, experimentation, agility, and innovation among bright and talented scholars. This STEAM community supports academics to develop meaningful relationships, foster transformative collaborations, and break new ground in all facets of their professional responsibilities while progressing through their chosen career paths. As such, STEAM Factory is a collective that can be self-activated to address emerging and changing needs, calls, and opportunities. While maintaining eight years of static internal funding, membership has grown tenfold, innovative programming continues to expand and grant awards have dramatically increased.

A. Office of Research Strategic Goals

The STEAM Factory's founding and evolving vision, mission, and initiatives are deeply connected to Ohio State's strategic goals and aspirations, as evidenced below. The Ohio State University's Office of Research strategic 2020 plan titled **Pillar III - Research and Creative Expression Aspiration** states**:** "Ohio State will be the leading land-grant university in research and creative expression excellence, creating new knowledge, solving critical societal challenges and driving the prosperity of Ohio, the nation and the world."[1]

1. Academic Community

"Build and sustain a culture of excellence that attracts, engages and supports top faculty and staff talent, enabling them to perform at the highest levels"

As an existing university asset with 219 faculty, staff, and post-doctoral researchers across 65 departments, coupled with extensive university and community connections of its members, STEAM Factory is uniquely positioned to address complex and evolving challenges. The network has aided in faculty recruitment efforts and provides a welcoming space for peer mentoring and mutual support efforts among members, especially new faculty; this naturally bolsters the University's faculty support and retention efforts. Furthermore, the STEAM Factory community continues to strengthen and grow as colleagues, departmental candidates, visiting faculty and friends are regularly invited to join programs and events. The engaged membership combined with STEAM programming provides critical framework throughout the creative process to identify problems, recruit allies, fund research, and express and disseminate results**.** Existing and in-progress work is currently tackling critical issues including climate change, racial justice, sustainable transportation.

2. Teaching and Learning

"Attract, develop, and support an inclusive and innovative community to educate future leaders in academia, industry, and broader communities"

[1] https://research.osu.edu/about-us/strategic-plan/

STEAM Factory is dedicated to creation and dissemination of knowledge, providing invaluable support to Teaching and Learning across the university and beyond. Members work closely with undergraduate and graduate students across disciplines to provide formal and informal learning opportunities and professional development experience. STEAM faculty teach in areas of city and regional planning, art and innovation, architecture and design, and community engagement, and Franklinton is an exceptional living classroom for many of these courses. STEAM provides its faculty and staff the opportunity to engage project-based courses directly with the community to work on a variety of challenges within a neighborhood that is undergoing tremendous economic, cultural, and social change. To date, over 250 graduate and undergraduate students have presented research, technology, and community projects at STEAM outreach events in Franklinton, and countless others are impacted directly and indirectly from the growth and learning of their faculty and instructors. STEAM Factory interns, hired from a diverse pool of undergraduate majors to support STEAM functions, benefit from regular interaction within the academic system in a more intimate fashion, introducing them to new concepts and further encouraging them to broaden their horizons through these interactions. Additionally, STEAM members participate in a huge range of educational programs, both internal and externally facing, which provides them opportunities to share their expertise with a variety of learners. From facilitating summer youth camps to multi-day academic conferences, STEAM Factory programming enables scholars to teach effectively and inspire others.

3. Interdisciplinary Research and Expression

"Establish Ohio State as the leading university in interdisciplinary research and creative expression"
From its inception, Interdisciplinary Research and Creative Expression has been at the core of STEAM Factory's mission and vision. All of STEAM Factory's core formal and informal programming creates a foundation for interdisciplinary research and creative expression and directly supports this goal. STEAM Factory includes members across 65 departments who are regularly exposed to interdisciplinary ideas and collaborative research opportunities in a pop-up fashion through formal and informal programs. By exploring these core features, members find the confidence and resources needed to step beyond their disciplinary walls and broaden their disciplinary perspectives in favor of more inclusive understandings and approaches that can benefit all aspects of professional work.

4. Resource Stewardship and Sustainability

"Provide high quality, innovative physical space, infrastructure and financial support for research and creative expression"
STEAM provides immense value on a shoestring budget to the university and larger Ohio community, significantly leveraging its university budget, securing additional grant funding, and garnishing industry support. With a volunteer-based Executive Leadership Board, volunteer working groups and two full-time staff members, STEAM Factory's practice of Resource Stewardship is well-supported. While maintaining static internal funding over 8 years, membership has grown tenfold, innovative programming continues to expand, and grant awards have dramatically increased. As an innovative collaborative hub and with an engaging physical space within a thriving urban, artistic downtown neighborhood, STEAM Factory enhances development of new fundable scholarly efforts and provides publicly facing programmatic offerings to amplify university research, all while increasing the quality of life and well-being and retention of its faculty. Similarly, STEAM Powered Project awards were created from a very small pool of fiscal resources and have been substantially leveraged by members for innovative interdisciplinary collaborations ranging from research efforts supporting ultimately successful NSF submissions, to the creation of an innovative student focused virtual reality platform for teaching in math, engineering, and physics, to the development of community engaged research and outreach opportunities.

5. Community Engagement

"Broadly expand Ohio State's research and creative expression engagement beyond the campus to accelerate impact"

STEAM Factory aims to be a leader in research-based outreach that connects scholarly work and creative expression across disciplines. Society faces a pressing need for public understanding of, and engagement with, contemporary scientific research and knowledge. Through a multi-disciplinary platform of research dissemination, integrating arts and humanities with the social, natural, and mathematical sciences and engineering, STEAM Factory links Ohio State scholars and the Columbus community. With a well-established, successful, and growing catalog of public-facing programs, coupled with the single most diverse network of Ohio State faculty and staff, STEAM Factory enhances the reach of Ohio State's world-class research and creative expression efforts. STEAM has provided broader impacts consultations and letters of collaboration for 100+ proposals for federal funding; these leverage STEAM's existing infrastructure of community engagement programs to connect diverse researchers with a broad audience and expand public understanding of Ohio State research. Recent work to build deeper community partnerships will provide avenues for interconnected community engaged research and outreach projects that can further amplify university impacts.

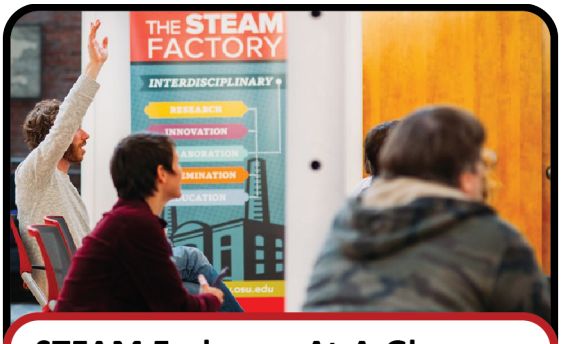
B. What We Do: Core Programs and Informal Activities

Through both formal and informal initiatives and programs, STEAM Factory provides substantive and light-hearted opportunities for members to learn from and work with scholars from vastly different disciplines and extends the reach of faculty scholarship beyond traditional avenues. Peer-to-peer events link scholars professionally and personally, increasing connections throughout their work as researchers, professors, and engaged citizens. Community- and student-facing initiatives, ranging from interdisciplinary dissemination and education projects to community-participatory research collaborations, further deepen interdisciplinary understanding among members and the community.

Figure 5: 2019 Membership Survey responses to "What comes to your mind when you think of STEAM Factory?"

1. STEAM Exchange

This monthly salon-style seminar brings together researchers from every discipline to share perspectives around a common theme. Targeting diverse faculty-focused audiences, these informal events are designed to maximize interaction and discussion among STEAM Factory members and their non-member colleagues.[2] Since 2013, 41 STEAM Exchanges have been organized with an average attendance of 38 faculty members. Over the past seven years, conversations stemming from these semi-structured exchanges have led a wide variety of crosscutting innovative collaborations that transcend traditional disciplinary boundaries (194 self-reported collaborations[3]) and has grown to be one of the most successful programs at STEAM Factory.



STEAM Exchange At-A-Glance:

- 102 faculty presenters in 64 disciplines
- 110+ attendee disciplines represented
- 99% attendees learned something new
- 77% interested in presenting
- 86% attendees value interactions outside their own discipline
- 92% likely to recommend a colleague

For example, Dr. Katherine Walton, Assistant Professor in the Department of Psychology and the Nisonger Center for Excellence in Developmental Disabilities, says that, "after speaking at STEAM Exchange (about family relationships and autism), I had a conversation with Wolfgang Sadee (Department of Molecular Immunology, Virology and Medical Genetics), who attended the exchange. This led to additional meetings and a research collaboration—looking at genetics of autism in large existing datasets. […] they will be doing the genetic analyses and I will be serving as the 'phenotype expert.' This is a team I definitely would not be working with if it wasn't for STEAM."

Strengths of the Program:

- Fosters intellectual curiosity, conversations, and connections among diverse Ohio State academics
- Brings together diverse scholars and invited guests around engaging member-chosen topics
- Furthers the University mission to increase collaboration and research impact
- Informal environment that can spark new research directions transcending disciplinary boundaries

[2] For more information about the STEAM Exchange program, please refer to the comprehensive report (pp. 25-31) at https://steamfactory.osu.edu/about/comprehensive-report.

[3] Results from 2019 biannual STEAM Factory membership survey.

Examples of STEAM Exchange Programs:

Chains

STEAM Exchange
November 21, 2019

Dr. Lisa Hall
Director, STEAM Factory
Associate Professor, Chemical and Biomolecular Engineering
Polymer Chains: Random Walks and Microscopic Structure in Materials

Dr. Alison Bennett
Assistant Professor, Ecology & Organismal Biology
Food Chains Updated: Representing All the Links

Ken Rinaldo
Professor, Art
Living System Chain: Roboticized Fish, Artificial Life and Aquaponic Gardens

Depression

STEAM Exchange
January 16, 2020

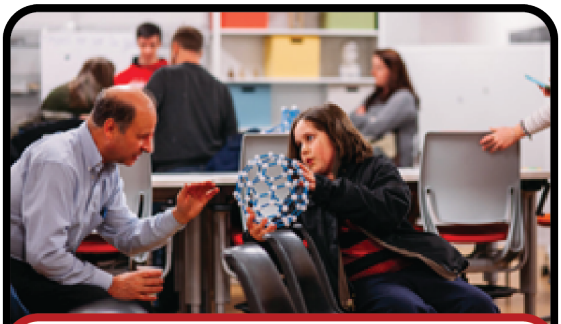
Dr. Daniel Strunk
Clinical Associate Professor, Psychology
Clinical Depression: How Cognitive Behavioral Therapy Can be Used to Treat Cogitive Bias and Depression

Dr. Alvaro Montenegro
Director, Atmospheric Sciences Program / Associate Professor, Geography
Existential Depression: The Long-Term Environmental Impacts of Burning All Available Fossil Fuels on Earth

Dr. Michael Betz
Associate Professor, Human Sciences
Economic Depression: How Stagnant Employment Opportunities Leads to Deaths of Despair and Drug Overdoses

2. STEAM Outreach

STEAM Factory helps bridge the gap between Ohio State and the city, enabling the university's research community to directly engage the public in discourse around scholarly efforts in art, science, technology, and more. Through Franklinton events and community festivals across a wide variety of venues, faculty, staff, and students can share research and work in an informal, pop-up outreach environment. Through accessible and fun programs for all ages, STEAM Factory increases the public awareness, understanding, and impact of research and scholarship at Ohio State. For example, scholars are provided with opportunities to present at a monthly open house held in tandem with Franklinton Fridays, a neighborhood-wide art, music, and gallery hop that typically attracts 150-300 people.



STEAM Outreach At-A-Glance:

- 33 Franklinton Friday open houses
- 38 Columbus Science Pub events
- 142 faculty presenters
- 250+ undergrad & grad students

Strengths of the Program:

- Broadens the impact of Ohio State research
- Deepens public understanding of research
- Gives researchers and students opportunities to share their work with a larger audience
- Supports mentorship in science communication skills
- Provides community members with access to experts

Examples of STEAM Outreach Programs:

Cat-Stravaganza

Franklinton Friday
January 10, 2020

The Cat Welfare Association 75 Years
Doug Grotegeer, Cat Welfare Association

Why Spay and Neuter/TNR is the Answer
Jay and Paula Matthew, Cat Welfare Association

Volunteer Opportunities
John Vlasko & Karla Rinto, Cat Welfare Association

FIV+ Cats and Kittens
Doug Grotegeer, Cat Welfare Association

What You Need to Know About Kidney Disease
Jessica Quimby, Internal Medicine (College of Veterinary Medicine)

Juvenilization of Cats and Why They Make Great Pets
Meg Daly, Museum of Biological Diversity

Fear-Hundred W Rich

Franklinton Friday
October 11, 2019

Event Highlights

Are Cars Scary? Planning for Safety in a Socio-Technical System
Dr. Jonathan Stiles, STEAM Factory

Major Life Transitions of the Xenomorph
Dr. Katherine O'Brien, Evolution, Ecology and Organismal Biology

How Fast Would We Be Extinct if Dracula Was Real?
Monica Delgado Carrillo, Mathematics

Scary as Health
Dr. Marium Husain, Medicine

Other Possibilities of Life Elsewhere
Dr. Ji Wang, Astronomy

Bats!

Columbus Science Pub
October 10, 2019

With Dr. Bryan Carstens,
Professor and Vice Chair, Evolution, Ecology and Organismal Biology

Every night bats leave their roosts to fly through the skies of Ohio, each individual eating many times its own body weight in insects on a given night. While there are currently 13 species of bats that call Ohio home, habitat change and fungal infections imperile local bat populations.

This talk introduced attendees to the life history and biodiversity of this group of mammals, while introducing them to leading-edge techniques of biodiversity discovery.

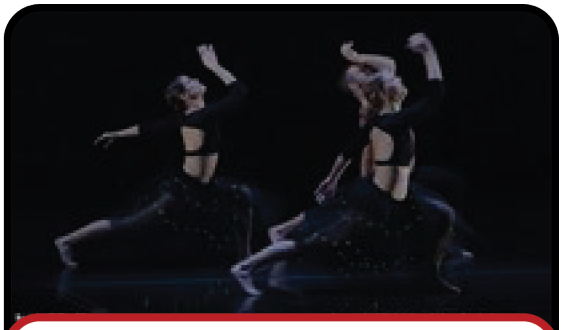
Transportation for our Future

Columbus Science Pub
September 5, 2019

With Dr. Harvey Miller,
Reusche Chair, Geographic Information Science
Director, Center for Urban and Regional Analysis (CURA)

Modern humans enjoy mobility levels that are unprecedented in history. In 1919 it would take a trip of 5 to 10 days to make the journey from London to New York city, a trip that today takes only 7 hours. While rapid transportation this has benefits, it also has enormous social, health and environmental costs. Harvey Miller discusses how resolving these costs is crucial if civilization is to survive the 21st century — a world that will see 10 billion people, most of whom will crowd into cities.

3. STEAM Powered Projects



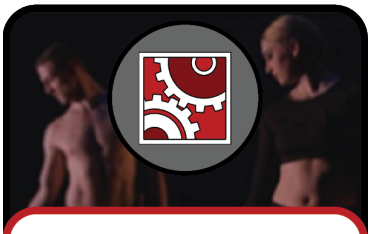
STEAM Powered Projects At-A-Glance:

- 13 interdisciplinary projects spanning research, teaching and outreach
- $81,693 awarded in total
- 29 STEAM Factory members awarded
- 22 disciplines represented

Since January 2016, this seed grant program has allowed researchers to pilot creative and potentially high-impact research ideas and build new cross disciplinary collaborations. These small dollar grants provide valuable financial support allow members to explore early stage projects that have the potential to attract external funding and expand research frontiers in new directions. The seed funding has been limited to $5,000 per member contributing to the collaboration with a maximum total of $25,000 per project. In 2017, 13 teams applied; after a peer-review process, 7 interdisciplinary teams were funded, with investigators representing 11 departments.

Strengths of the Program:

- Provides small funds for high impact research ideas and builds new cross disciplinary collaborations
- Seeds early-stage projects that have the potential to attract external funding
- Vital funding for collaborations in the arts, humanities, social sciences, and traditional STEM fields
- Creates opportunities to catalyze new research, teaching, and engagement initiatives that bring together diverse disciplinary expertise in a new way to solve complex challenges
- Broadens the impact of Ohio State research



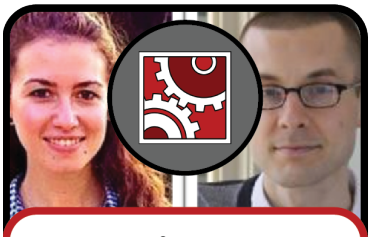
Song of the Stars

STEAM Powered Project
October 11, 2019

Primary Investigator:
Dr. Paul Sutter - Visting Fellow, Physics and Astronomy

STEAM Collaborators:
Dr. John Beacom - Professor, Physics and Astronomy
Dr. Leonardo Carrizzo - Lecturer, Communication
Dr. Mary Tarantino - Professor, Theater

A ground-breaking cross- disciplinary production engaging astrophysicists, dancers, and filmmakers to create a world-class performance designed to humanize science, awaken curiosity, and intimately connect audiences to the wonders of the universe.



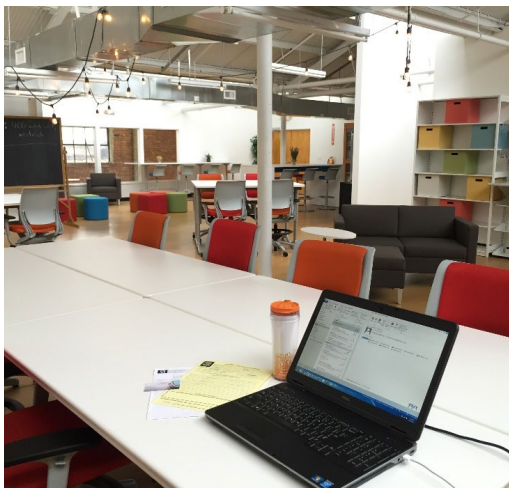
E-Textile Origami

STEAM Powered Project
October 10, 2019

Primary Investigators:
Dr. Asimina Kiourti - Assistant Professor, Electrical and Computer Engineering
Dr. Ryan L. Harne - Assistant Professor, Mechanical and Aerospace Engineering

This collaborative project will establish the efficacy of a new cross-cutting technology-bridging wave physics, art and mechanics The new idea of this project is a foldable e-textile antenna, whose conductive surfaces follow the conformation of an origami tessellation. The large shape change enabled by the proposed tessellated antenna is anticipated to result in orders of magnitude tuning of its resonant frequency. As such, the antenna can be integrated into objects as diverse as clothing, toys and bridges to sense mechanical loads and flexure.

4. Physical Space for Academic Co-working and Collaboration



STEAM Factory provides a creative space for brainstorming research ideas and potential research innovation. Flexible and agile, the space supports a co-working environment and is designed to be easily reconfigured for individual or collaborative work. This space is also warm and inviting and provides an additional space to Ohio State scholars outside of their offices, labs, and homes to do innovative and cross-disciplinary work. Members also have unrestricted access after business hours. Over the past five years, 250+ events have been hosted in this space including roundtable discussions, workshops, conferences, public forums, dance and music performances, colloquia, classes, documentary film screenings, and faculty and student research showcases across a wide range of disciplines (see Figure 6).

Benefits from flexible co-working space

- Accessible downtown location with a relaxed, productive workspace encourages faculty to work together
- Creates an interdisciplinary, open, and inviting home base for diverse and engaged scholars
- Shared environment and resources reinforce flat organizational structure and collective activities
- Facilitates faculty communication across colleges and departments
- Provides a safe space for peer mentorship and feedback, particularly for tenure-track faculty
- Experiential lab for faculty to organize programs and events outside departmental expectations

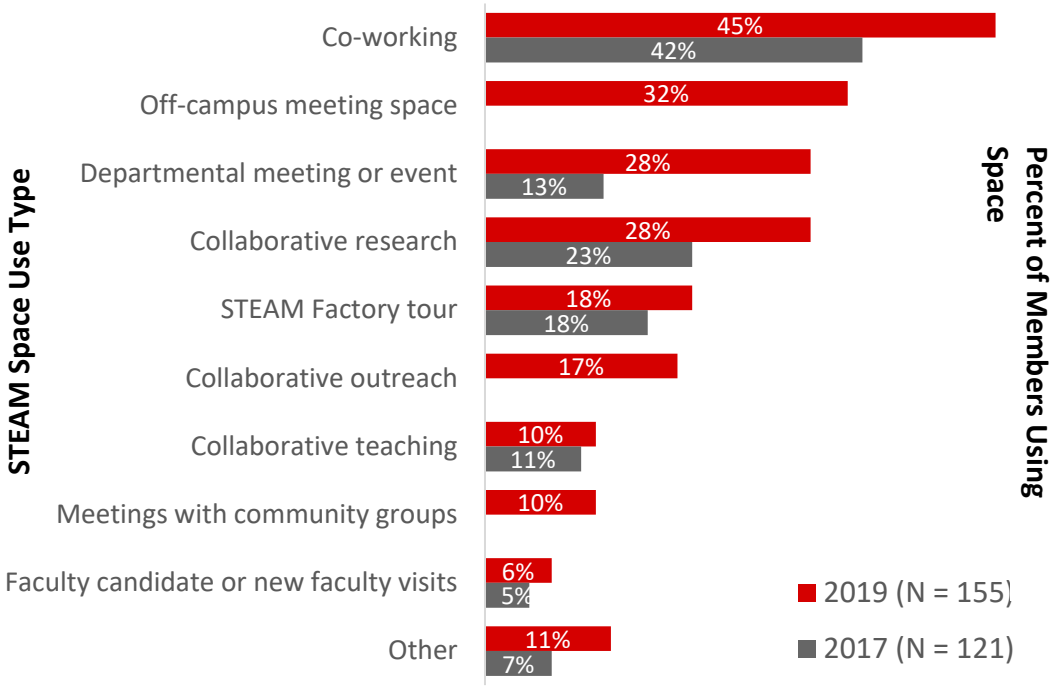


Figure 6: STEAM Factory Space Use, 2017 and 2019 Membership Survey

5. Interdisciplinary Postdoctoral Research Program

In 2019, STEAM Factory partnered with the Sustainability Institute, Honda Research, and Ohio State Energy Partners to support the first STEAM Post-Doctoral Fellows Program. This resident post-doctoral fellow program serves to enhance STEAM's research and dissemination opportunities for Ohio State scholars across traditional disciplinary silos and academic disciplines. The thematic focus areas for the two-year program were Sustainable Urban Systems Mobility and Smart Cities. These challenges of urbanization are extremely complex and vexing, with significant implications for environmental sustainability, health and well-being, economic growth, and social equity, and they require an interdisciplinary approach.

In the past year through this program, STEAM welcomed Dr. Jonathan Stiles and Dr. Atar Herziger into postdoctoral research positions. Both were recruited from a broad range of academic disciplines, with interdisciplinary experience and research goals that aligned with STEAM's research mission and urban location. With a cross-disciplinary co-mentorship model and a commitment to community engagement and public outreach, it is expected that these scholars will promote new cross-disciplinary connections that can lead to breakthrough innovations. The recruitment of these scholars by STEAM, rather than an academic department, offers an extraordinary position of flexibility for postdoctoral scholars—it encourages the creation of novel research programs across disciplines, independent and innovative thinking, and leadership. STEAM Postdoctoral Scholars actively engage in University-wide initiatives through the Office of Postdoctoral Affairs and have developed new programs, including a Job Market Preparation and Post-Doctoral Support series, that leverage the wide range of disciplinary expertise in the STEAM Factory. Through these partnerships and awards, STEAM Factory has raised nearly $250,000 for interdisciplinary post-doctoral research positions.

6. Student Education and Mentorship

Formal and informal learning opportunities are provided to both undergraduate and graduate students in the STEAM Factory **off-campus learning space.** Many STEAM faculty teach in areas of city and regional planning, art and innovation, architecture and design, and community engagement, and Franklinton is an exceptional living classroom for many of these courses. STEAM provides its faculty and staff the opportunity to engage project-based courses directly with the community to work on a variety of challenges within a neighborhood that is undergoing tremendous economic, cultural, and social change. This physical space lies within a dynamic downtown urban neighborhood and provides faculty the opportunity to extend teaching and learning beyond the four walls of their traditional classrooms. Franklinton is itself a complex and transitioning neighborhood, one that is characterized by longstanding disinvestment and poverty, blighted industrial uses, recent rapid gentrification, and development due to the proximity to a burgeoning downtown. In addition to place-based coursework, STEAM student interns work closely with disciplinarily diverse faculty and staff in the planning and implementation of programs both on and off campus and are given a variety of opportunities to **engage with business and industry partners as well as members of the general public**.

C. Outcomes and Impacts

"What Ohio State does matters. And how we do it matters. When we are at our best, we make a real difference to people." – Office of the President, Strategic Plan[4]

[4] https://president.osu.edu/strategicplan/.

1. Faculty Outcomes

i) Informal, unstructured interdisciplinary collaboration

STEAM Factory has provided scholars with a gateway to diverse units, resources, and faculty from across the university. In the past four years, members developed over **194 disciplinary cross-cutting collaborations**[5], ranging from new cross-cutting technology that connects wave physics, art and mechanics to develop e-textile functionalities; to connections between history and archaeology research to better understand climate and human migration patterns. Several collaborations have expanded beyond pilot projects and have led to over 30 peer-reviewed journal publications or academic conference presentations and over 35 proposals to secure external funding.

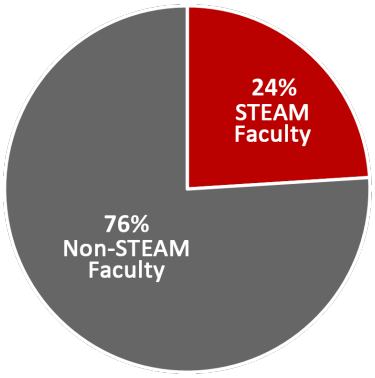


Figure 7: NSF Early Career Awards at Ohio State 2015-2020 (Source: NSF)

ii) Increased research impact through engagement with the Columbus community

STEAM Factory has an established eight-year track record of making the Buckeye Nation's scholarly endeavors relevant and accessible to the diverse people of Columbus. Through collaborations with COSI, resident artists at 400 W. Rich, innovators at the Idea Foundry and many others among the growing creative community in Franklinton, STEAM Factory brings Ohio State's mission directly to faculty and residents. In line with a programmatic logic model developed in 2013, STEAM Factory has measurable value to faculty, students, staff, and the Central Ohio community.

By connecting with community partners and the public, STEAM Factory provides faculty and student scholars with an avenue to broaden research impacts. 142 faculty have participated in outreach events to present research to community members of all ages.

STEAM Factory has committed to provide such access for its members with 100 letters of collaboration for research proposals, potentially contributing to the above average success rates for faculty in prestigious research grants. Since 2015, **24% (14 of 58) of Ohio State's NSF Early Career Awards** were awarded to STEAM Factory faculty (Figure 7). In comparison, roughly 5% of junior faculty at Ohio State are STEAM members. Over a third (35) of the proposals submitted by faculty with a letter of collaboration from STEAM Factory have been funded, the majority (23) being from NSF (see Figure 8), securing a total of over $12 million in research funding.

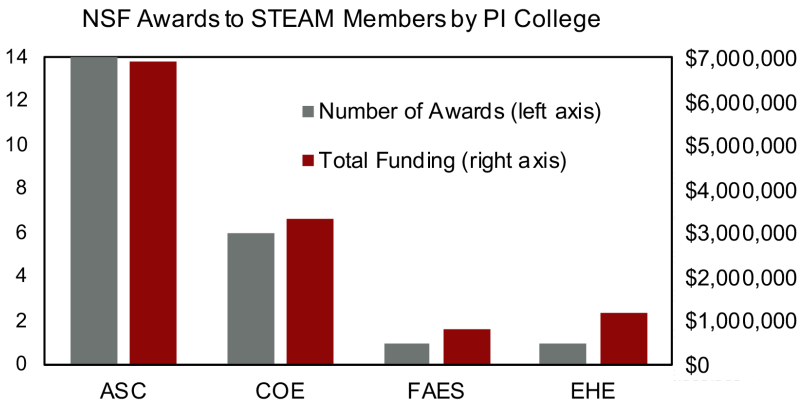


Figure 8: Grants received with STEAM Factory Letter of Collaboration

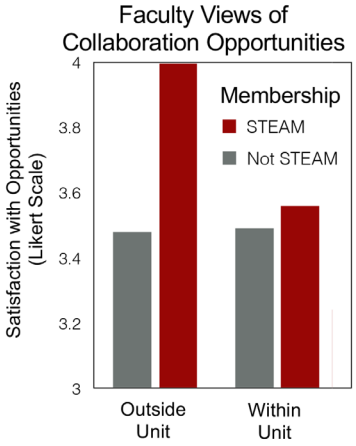


Figure 9: Results of OSU Faculty Culture Survey Regarding Collaborations

[5] Results from 2019 biannual STEAM Factory membership survey.

100 Proposals with a STEAM Letter of Collaboration

23 NSF Grants Funded with STEAM Faculty PIs

$12,621,612 Awarded to STEAM Faculty PIs

iii) Quality of life at The Ohio State University

Through a peer-network of scholars, with a shared interest in learning from each other and the community, STEAM Factory provides a community that enhances quality of life in Columbus. An analysis of the University-wide Faculty Culture Survey administered by the Office of Institutional Research and Planning in 2016 indicates that junior faculty affiliated with STEAM Factory are more satisfied with their employment and members are more satisfied with opportunities to collaborate, especially outside their department/unit (Figure 9). This provides an indicator of the impact that STEAM Factory has in supporting both professional and social networks to improve quality of faculty life. STEAM Factory has become a model in the development of peer mentoring initiatives throughout the university. Partnering with various offices[6], colleges and departments, this supports university recruitment and retention efforts.

Feedback from members and responses from an independent faculty culture survey, which did not specifically target outcomes relating to programming, provide reliable measures of the impact that STEAM Factory has in enhancing opportunities for interdisciplinary collaboration and in supporting both professional and social networks to improve quality of faculty life at The Ohio State University.

2. Staff Outcomes

i) Forming a network, finding your people

Featuring a vast network of faculty and staff from across the university, STEAM Factory provides a unique opportunity for all members to form new bonds outside their own departments and offers engagements that keep members connected while promoting random interactions with new collaborators. For staff, this is especially valuable as it establishes a wide scope of networking not supported through other university departments or initiatives. Furthermore, the intentionally flat organizational structure of STEAM Factory reinforce equity by seeing all members on a level playing field - usurping traditional university power structures, affording all staff members opportunities, and amplifying emerging voices.

> *"The thing that STEAM provides for me is space to think. The space itself fosters a more creative mindset. Having it be neither work nor home, yet be homey and conducive to work helps me to think about things more clearly and completely. It provides breathing room and inspiration."*
>
> *- Katie O'Keefe,*
> *Instructional Designer, Pharmacy*

6 For list of faculty recruitment and networking activities, see comprehensive report pp 70-80 at https://steamfactory.osu.edu/about/comprehensive-report.

ii) Providing an inviting and collaborative space

More than a coworking space, STEAM Factory offers a home away from home for many members, especially during critical events such as writing a manuscript, drafting a proposal, or brainstorming an initiative. Staff members find considerable value in knowing that an interdisciplinary environment away from their own domain is accessible. Not only are their work needs accommodated, but the environment offers features that improve quality of life, such as snacks and coffee and productivity, such a plentiful brainstorming materials and breakout rooms. This level of comfort and inspiration, regardless of whether working alone, as part of a team, or a part of a community of practice, is a key draw for many.

iii) Amplifying your efforts

STEAM Factory is a community that members rely on for seeking collaborators, whether to pilot new initiatives or expand a successful initiative. With members drawn from wide range of disciplines and having diverse life experiences, messages to the listserv and in-persons/virtual programs yield answers to complex questions, fodder for innovation and ideas for scaling change. Likewise, members are inherently interested in learning outside of their discipline, making STEAM Factory a critical audience with whom to share seminar and featured event information.

3. Postdoctoral Outcomes

i) Building an interdisciplinary network

STEAM Factory enables postdoctoral researchers to discover a world beyond their discipline and integrate the unique concepts learned through these interactions with their own work. Through coworking, events and the physical presence of STEAM Factory's own interdisciplinary postdoctoral researchers, members feel welcome to explore new ideas in their own domain while drawing inspiration from the work of others.

> *"[STEAM Factory] recharges and energizes by exposing me to creativity and productivity outside my field/department."*
>
> *- Dr. Atar Herziger,*
> *Postdoctoral Researcher, STEAM Factory*

ii) Amplifies research opportunities

In addition to its own postdoctoral research program, STEAM Factory supports ongoing work through letters of collaboration for research proposals and STEAM Powered Projects focused on education beyond the classroom. Postdoctoral researchers also engage with community partners and the public, providing an avenue to broaden research impacts. Together, these initiatives enable a level of access and integration with local issues that is more holistic than traditional avenues and provides a sense of community at Ohio State and beyond.

> *"I found the STEAM Exchanges extremely useful to learn things outside my area of research, which is critical to broadening my perspective and forming a holistic view of science. The opportunity provided to interact with people with diverse backgrounds has helped my interpersonal skills as an interdisciplinary scientist. The STEAM spotlight made me feel recognized and helped my work reach a much broader audience."*
>
> *- Dr. Wasiur KhudaBukhsh,*
> *Postdoctoral Researcher, Public Health*

iii) Develops useful job market skills and capacities

STEAM's diverse environment and grassroots leadership structure provides post-doctoral researchers opportunities to develop extensive useful professional skills and capacities. The diverse academic community coupled with our core and informal programs create an experiential framework where post-docs develop personnel management, project management and leadership skills. These include valuable

opportunities for young academics to learn how to work with individuals of diverse backgrounds, learn to manage conflict and have difficult conversations, develop, maintain and lead manage collaborative team projects and understand how their role and work fits into the larger picture and are crucial skills whether they go on to positions within the academy, industry or public services.

iv) Increases research visibility through community engagement

STEAM Outreach events allow for the presentation of research to community members of all ages. Postdoctoral researchers are uniquely positioned to utilize these events to not only present evolving research, but also find their strengths in public engagement and communication during this critical period in their careers. The physical space and expansive network of STEAM Factory welcomes and inspires postdocs throughout their appointment, providing a safe and fun environment for sharing ideas across disciplines and with the public.

> *"STEAM Factory has provided beautiful and welcoming space in-kind for Be the Street artistic residencies and community performances, reaching around 300 OSU students, faculty, staff, and community members. Charlene, specifically, has supported my work and helped spread the word about programming I'm offering and has helped make it more visible after it's completed."*
>
> *- Moriah Flagler,*
> *Postdoctoral Researcher, Theatre*

v) Peer mentoring and support

STEAM's interdisciplinary environment creates a perfect opportunity for post-doctoral researchers to connect with a diverse academics across research, education and service. STEAM provides opportunities for to interdisciplinary peer mentoring across academic positions and the opportunity to develop vital leadership and professional skills. This includes both a professional and personal support network that affords opportunities to connect with faculty, staff, and fellow postdoctoral researchers, regardless of any interruptions to on-campus/in-person life.

4. Student Outcomes

i) Science communication to public audiences

Over 130 graduate and undergraduate students have presented research. For example, Pecha-Kucha presentations by student-groups explored a transformative, controversial, or an under-appreciated aspect of the HIV epidemic. These presentations formed the capstone project of a multidisciplinary undergraduate course that traces the evolution of HIV through genetics and human history; students delivered their talks to a diverse audience of academics, social workers and community members.[7] Such opportunities help train the next generation of interdisciplinary scholars and science communicators.

> *"I have learned so much already from my short time interning at STEAM. The most valuable thing I have learned is how much knowledge people have and how beneficial it can be to have a space where knowledge exchanges occur. . . . Just from interviewing a few faculty and researchers for assignments, I have been able to learn more about things that I am interested in that I have in any of the classes I've taken in my last 4 years at Ohio State and that is something that needs to be taken advantage of."*
>
> *- Alexa Cohen,*
> *Undergraduate Intern, Class of 2018*

[7] For details, see comprehensive report pp. 35 (steamfactory.osu.edu/about/comprehensive-report).

ii) Off-campus and experiential learning

Members work with both undergraduate and graduate student interns who receive professional development experience on a variety of tasks within a multidisciplinary environment.[8] This not only allows students to engage with the academic system in a more intimate fashion, but further encourages them to broaden their horizons through these interactions. Not unlike the approach STEAM Factory takes for members, students are pushed to experience work outside of their disciplines and work together to accomplish great things. Student interns have reported positive feedback, highlighting the value of an off-campus internship in a start-up environment.

STEAM Factory worked with faculty to host and develop student projects for 8 capstone- or project-based courses.[9] Collaborative projects among STEAM Factory faculty have supported training and mentorship of 10+ postdoctoral scholars, 30 graduate students, 28 undergraduate students and 17 community members who worked with faculty and other students across disciplines.[10]

iii) Exposes students to a wide variety of research disciplines and perspectives

STEAM Factory prepares students for meaningful lives and careers. It exposes interns and students to an incredibly diversity of research disciplines and helps to develop important, transferable personal and professional skills. These skills, such as critical thinking, effective communication, analysis, and reflection are essential and critical for development at all life and career stages. STEAM fosters opportunities for students that encourages a love of learning, ignites enthusiasm and addresses learning interests and differences for students. Connecting students' disciplinary skills in STEM, arts, humanities and social and behavioral sciences with diverse faculty and publicly engaged work expands students' breadth of skills and expertise while enhancing educational and career opportunities. STEAM Factory interns benefit from regular interaction within the academic system in a more intimate fashion, introducing them to new concepts and further encouraging them to broaden their horizons through these interactions.

iv) Working closely with diverse faculty outside of the classroom

Having access to a large academic network that spans broadly across the university, students are afforded fantastic opportunities to interact with professionals in their field and beyond. To further accent their experience, students often assist with program and event management, allowing them to work closely with members and community partners to enable great work. This ultimately leads to more accomplishments in project-based work, increased understanding of the academic system and broader connections across the City of Columbus.

5. Community Outcomes

i) Leadership in informal learning and public engagement

STEAM Factory aims to be a leader in research-based outreach that connects scholarly work and creative expression across disciplines. Society faces a pressing need for public understanding of and engagement with, scientific research, including engaging informal interactions with new and cutting-edge research, technology and discovery. Through a multi-disciplinary platform of research dissemination, integrating arts and humanities with the social, natural and mathematical sciences and engineering, STEAM Factory aims to be a bridge between Ohio State scholars and the Columbus community.

[8] For details about the Internship program, see comprehensive report pp. 110 (steamfactory.osu.edu/about/comprehensive-report).

[9] For details, see comprehensive report pp. 106-109 (steamfactory.osu.edu/about/comprehensive-report).

[10] Self-reported data based on STEAM Factory members survey conducted in September 2017.

Through the STEAM Outreach program, faculty engage public audiences of all ages in an interactive, informal science learning environment[11]. Typical **attendance at these events has ranged from 150-300** with maximum attendance exceeding 600. By participating in local neighborhood events (Franklinton Fridays), Ohio State researchers interact directly with the community where they live, increasing the accessibility of science information for an under-served population in Franklinton. In the past five years, **over 100 outreach events have been organized, reaching more than 18,000 community members**.

> *"[T]he experiences [Declan] had interacting with STEAM Factory folks have helped to feed his hungry mind in a way that, frankly, schools (even his Montessori) can't. The opportunity for him to meet and speak to a group of real-life scholars in mathematics, robots, computer animation and physics, then ask them anything he wants to in a casual environment has been so enriching. You cannot find that anyplace else in town."*
>
> *- Tracy Zollinger,*
> *Mother of 8-year old Declan*

ii) K-12 Schools and Educators

STEAM Factory has supported seven faculty-led efforts to connect with education organizations in Ohio, including the Columbus Math Circles, the Ohio Council of Teachers of Mathematics (OCTM), the Ohio Mathematics Educational Leadership Council (OMELC), Beyond the Classroom: Girls Exploring Math (summer high school girls math camp), the Computer Science for All (CSForAll) Initiative in partnership with Battelle Industries, Columbus Chess Academy and the Science Education Council of Ohio (SECO). These partnerships support sharing and disseminate innovative and research-based teaching practices.[12]

Furthermore, STEAM Powered Projects (SPP) have focused on education beyond the classroom. A collaborative SPP – MoBILiSE – led by Zakee Sabree (Assistant Professor, Evolution, Ecology & Organismal Biology) and Kathy Malone (Associate Professor, Science, Technology & Mathematics Education) developed a modeling-based high school (7-12th grade) biology curriculum aligned with bioengineering projects by collaborating with local biology teachers and engineering educators. This project received additional external grant funding from the Ohio Department of Education. Impromptu initiatives, such as summer 2020 professional development for educators and bi-weekly office hours by outreach professionals, emerged during the pandemic in response to an identified need led by STEAM Factory members Cynthia Canan, Jason Cervenec, Monica Delgado-Carrillo, Katherine O'Brien, Courtney Price and Wayne Schlingman.

iii) Recognition from peer institutions and the Columbus community

STEAM is unique. STEAM Factory's model for grassroots academic collaboration and outreach has received attention from Universities across the United States. STEAM Factory's model for grassroots academic collaboration and outreach has received attention with invitations from Universities across the United States, including the University of Illinois, University of Minnesota, Rutgers University, Vanderbilt University and the Visitor Studies Association, to share the origin story and progress of the STEAM Factory model.

[11] See attached letter of appreciation from a Tracy Zollinger, parent of 8-year old school student, 2018 Business Proposal Appendix pp. 32 (https://osu.box.com/s/7d3hzff0aovi4csldujhs3rh9odz2ln).

[12] See letter of collaboration from Teddy Chao attached in the 2018 Business Proposal Appendix pp 30 (https://osu.box.com/s/7d3hzff0aovi4csldujhs3rh9odz2ln).

D. Collaborations and Partnerships

STEAM Factory has collaborated with diverse internal and external organizations within Ohio State and across central Ohio including 20+ Centers, Institutes and Initiatives to organize faculty engagement and networking events as well as developing substantive public engagement programs. This has led to partnerships with community organizations, working together to create a culture of collaboration. Below are examples of some of our multiple partner organizations supported with letters of collaboration[13]:

Collaborations with Centers/Institutes and Initiatives at The Ohio State University

1. Advanced Computing Center for Arts and Design (ACCAD)
2. Byrd Polar and Climate Research Center
3. Center for Cosmology and Particle Physics (CCAPP)
4. Crane Center for Early Childhood Research (CCEC)
5. Center for Automotive Research (CAR)
6. Center for Aviation Studies
7. Center for Ethics and Human Values (CEHV)
8. Center for Languages, Literatures and Cultures
9. Center for Life Science Education
10. Center for Slavik and East European Studies
11. Center for Regional and Urban Analysis (CURA)
12. Discovery Themes Program
13. Erdos Institute
14. Food Innovation Center
15. Humanities and the Arts Discovery Themes
16. Mathematical Biosciences Institute
17. OHI/O Informal Tech Learning Program
18. Sustainable and Resilient Economy Discovery Theme
19. Ohio Manufacturing Institute
20. Translational Data Analytics Discovery Theme
21. The Barnett Center for Integrated Arts and Enterprise

Collaborations/Partnerships with Community Organizations:

1. Center for Science and Industry (COSI)
2. Columbus Idea Foundry
3. Cover My Meds
4. Franklinton Development
5. Gladden Community House

> *"Steam Factory has been a valued collaborator with CoverMyMeds, allowing us to advance healthcare technology together through collaboration around talent development, academic/industry idea exchange, and specific analytic approaches."*
>
> *- Matt Scantland,*
> *Co-Founder, CoverMyMeds*

> *"With Franklinton residents tending to have very low education levels . . . . STEAM Factory brings a wealth of knowledge and research which when shared with residents has helped to build the education well being of the community."*
>
> *- Joy Chivers,*
> *President and CEO, Gladden Community House*

[13] For letters of collaboration, please see 2018 STEAM Factory business proposal: https://osu.box.com/s/7d3hzff0aovi4csldujhs3rh9odz2lnd.

Section III

What We Are Doing Now: 2020 - 21 Priorities and Initiatives

This year, STEAM continues to deepen and refine its mission within Ohio State and develop innovative, substantive, engaging, light-hearted, and cohesive academic community programming focused on creating the most diverse and engaged faculty network at the university. Moving forward, STEAM Factory will have a phased movement toward its institute vision. During FY2020-21 efforts, STEAM will continue to wisely steward its limited resources toward high impact initiatives while continuing to explore strategic opportunities for external funding including federal funding and industry funding partnerships such as STEAM currently has through the NSF, Honda of North America, BETHA, and Ohio State Energy Partners.

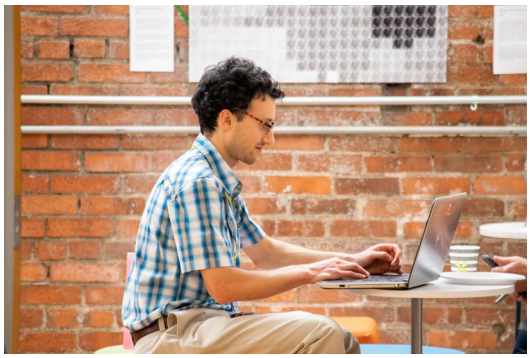
The COVID Disruption – March 2020 through Present

It is not an understatement to say that 2020 has been a strange and unusual year, fraught with previously unforeseen disruptions and challenges across the board. There are countless ways that COVID-19 has cancelled plans, from ongoing research, to educational opportunities, to ways to be present in local communities. During this difficult time, STEAM Factory has taken time to return to its roots and lean into a community built together. Early in the pandemic, both long-standing and well-loved core programs like STEAM Exchanges and Science Pubs were transitioned into virtual formats for mass zoom gatherings. Many informal programs, gatherings, and initiatives were also transitioned into virtual versions. Membership needs and capacities changed significantly as the pandemic moved from a novel situation to a longer-term challenge. Some programs stayed meaningful in the virtual format while others were less needed, and STEAM continues to adapt to meet current member needs and interests. STEAM Factory looks forward to a safe return to our core programming soon.

- Columbus Science Pub – Successful and ongoing with increased frequency, hosted twice monthly
- STEAM Exchanges – Initially virtual, now this program on hiatus until it is safe to meet in person.
- Franklinton Fridays – This program is on hiatus until it is safe to meet in person.
- STEAM Powered Projects – On hiatus with this seed funding opportunity until funding secured.
- Co-working and Collaboration space – Extremely limited use and occupancy controlled for safety.

A. New Programs and Initiatives

1. STEAM Stay Connected: Transition to Virtual Programming



STEAM Stay Connected came from where all good STEAM-related things derived. . . from members! The need for this program was immediate and STEAM Factory created opportunities to crowd-source questions and share resources and answers related to very real concerns and needs. This virtual platform provided a more robust and scheduled way for members to connect during the initial shutdown and transition period due to the pandemic. This included daily opportunities for casual conversations, research/disciplinary presentations/discussions, hosting classes, highlighting hobbies, and sharing activities programs for the mental and emotional well-being of all ages. Questions such as, “What are you doing academically?”, “How are you transitioning your

research?" or simply, "How are you and what's on your mind?" were at the forefront of these efforts to serve the evolving and immediate needs of the membership.

Below is an example of the many varieties of STEAM Stay Connected virtual programs and resources provided to STEAM members and their communities and families:

- ***Robotics 101*** *- Hosted by Andrew Frueh, Departments of Art and Design. Have you been hankering for some hacking? Join for a casual open session about Arduino, electronics, and robotics. No experience is required. You are welcome to watch and ask questions, though if you want to follow along you will need an Arduino and some basic electronic parts. Discussion will be on various topics led by participant interest. Each session will be drop in style so join when you are able.*
- ***Columbus Science Pub goes Virtual*** *– Hosted by Katherine O'Brien (STEAM Factory Post-Doctoral Researcher. The Columbus Science Pub, part of the global 'Science Cafe' movement (http://sciencecafes.org/), aims to present scientific issues of general interest to the public in a relaxed and comfortable atmosphere.*
- ***STEAM Exchanges go Virtual*** *– Hosted by rotating STEAM members. These successful monthly themed interdisciplinary seminars highlight multiple faculty perspectives and foster engagement, discovery and opportunities for cross-collaboration between diverse disciplines. This program is intended to facilitate both knowledge and interactions related to current and on-going faculty research at Ohio State.*
- ***Coronavirus and our research practice:*** *Hosted by STEAM Post-Doc, Jon Stiles. The new Coronavirus has both immediate and future implications for our research efforts. Are you considering new research questions or methods in light of the Coronavirus? How have you adapted to all the conference cancellations? Let's share examples of how other researchers are adapting and helping create knowledge.*
- ***Quarentinis!! STEAM virtual happy hours –*** *pour a beverage, click zoom and join the fun!*
- ***STEAM coffee and conversations –*** *Hosted by Charlene, this time is the perfect opportunity to grab your hot cup of coffee and check in, chat and connect with other STEAM members in an informal way. No agenda, just lots of friendship and conversation about anything and everything.*
- ***Toddler Time - Activities for Little Ones (Ages 0-3)*** *- 9:30am to 10:00am. Hosted by Lisa Hall, Director at STEAM Factory, Chemical Engineering. This is a time to get our toddlers together for a little play, visual stimulation or just company for the adults. Activities could include singing, art activities, show and tell, sharing favorite stories, or whatever we feel like doing at the moment.*
- ***iPad Art*** *- Hosted by Andrew Frueh, Departments of Art and Design. Join us for a casual session and learn about making art with your iPad. Andrew will demo various techniques, compare apps and answer questions from participants. Bring your iPad and make some art. Open to all ages.*
- ***The Joy of Photography –*** *Hosted by Gabriel Cuddy. Beginners and hobbyists, learn about the wonders of photography and phot editing from fundamentals of composition to manipulation in the Adobe Lightroom & Photoshop. All that is needed is a smartphone and a desire to learn.*
- ***STEAM Slack account –*** *use the link to join the STEAM Slack channel and conversations – Highlights include channels for conversation and co-working, academic resources, concerns and channels to share pics of pets, kiddos and favorite recipes.*
- ***Let's Look at DNA (Ages 6 to 12)*** *– Hosted by Courtney Price, Education & Outreach Specialist at the Center for Applied Plant Sciences & Arabidopsis Biological Resource Center.*
- ***Outreach Chat - Working with Community Partners*** *– Hosted by Courtney Price, Education & Outreach Specialist, Center for Applied Plant Sciences & Arabidopsis Biological Resource Center.*

2. **Behind the Scenes**

Motto: Let us answer all the questions you have but are too afraid to ask ...

In 2020, STEAM Factory added the Behind the Scenes series to its faculty engagement programming to support efforts with early-career faculty and bring to light the "hidden curriculum" of academia. This series is an interdisciplinary, faculty-driven program that addresses a diverse range of faculty roles, topics, and concerns throughout the lifespan of an academic career in a candid peer-to-peer panel format. Special care is taken to include faculty with diverse voices from a wide range of disciplines and career stages. The series has received overwhelmingly positive feedback despite the recent shift to virtual engagement. This speaks both to the incredible need for early career faculty to receive this form of guidance, but also the versatility of STEAM programming to provide it. Early topics have included:

- **Behind the Scenes: The Tenure Process**: this event included faculty panelists who have recently submitted a tenure package, those who have served on college tenure committee, those who have seen the packages come through the Provost's office, and more.
- **Behind the Scenes: Building Your Network as an Early-Career Faculty Member**: this session featured first-year tenure track faculty, original founding STEAM Factory members, and full professors sharing their insights and wisdom as to how to form both organic and strategic networks to support research, teaching, service, and life goals.

> *"I appreciate the truly behind the scenes focus - learning how readers interact with the tenure packet informs how I narrate my work."*

> *"Most useful event I've attended to date."*

3. **Interdisciplinary Racial Justice, Diversity and Equity Institutional Certificate Program**

Working with an interdisciplinary team of diverse collaborators including faculty, staff, researchers and community partners, STEAM Factory, the Kirwan Center for Race and Ethnicity and community partner, Ohio Campus Compact are working to build a *Racial Justice Pathways certificate program.* This project team was called together from a collective STEAM member need to respond thoughtfully, meaningfully, and critically to the Black Lives Matter movement, systemic racism, and societal injustices.

This initiative began quickly, as numerous STEAM members self-organized around the desire to do meaningful anti-racism work, both personally and within academia. In just a few short months, this initiative has grown to be a substantive effort in which the Racial Justice Pathways program is just one component of a larger Racial Justice Initiative that is still emerging. The core project team, including STEAM Factory's Program Director, Content Specialist, and Faculty Director, are deeply committed to the development and institutionalization of this effort. Recently, this core project team and university partners submitted a proposal to the Office of Research Seed Fund for Racial Justice. STEAM and the entire project team are committed to this effort, even if in an alternate form, regardless of immediate funding.

The proposed initiative will develop a year-long pilot curriculum that enables Ohio State faculty and staff to critically examine their own beliefs in a way that integrates racial justice and decolonizing practice into their research, teaching, outreach and extension, and service activities. This transformative, grassroots anti-racism initiative will build faculty and staff capacity to design, enact, and sustain racial equity at every level of Ohio State. Leveraging the *STEAM Factory*'s network of engaged faculty and staff, *Kirwan Institute for the Study of Race and Ethnicity*'s expertise in understanding institutional racism, and *Ohio Campus Compact*'s micro-credentialing efforts, the entire project team is uniquely positioned to develop and provide Ohio State faculty and staff with tools they need to address and dismantle institutional racism and inequities at all levels of the university. This program will inform and be informed by the national *Campus Compact* organization's work developing a third party certified micro-credentialing program on Equity and Inclusion in partnership with *Ohio Campus Compact*.

Through this program, this team will develop materials for **scaling, translating, and customizing** this model first at Ohio State and via *Ohio Campus Compact*'s existing network of colleges and universities in Ohio and nationwide. By developing these interdisciplinary tools and resources for Ohio State faculty and staff—thought leaders that interact daily with peers, graduate and undergraduate students and the general public in their roles as teachers, advisors, mentors and community members—the program will directly impact countless members of the Ohio State University and local communities. Throughout the development and piloting of this curriculum, data on the needs of and benefits to the pilot cohort and on interactions/impacts they have on others will be used to iterate and refine these ongoing generative efforts and seed further research and extension. This pilot anti-racism curriculum will consist of four parts including:

- ***Research and Writing/Introspection***
- ***Teaching and Student Services/Transformative Access Pedagogy***
- ***Outreach & Extension – Building Inclusive Public Engagement with Our Work***
- ***Service – Building the University We Want to See***

B. Membership Academic Engagement Programs

Through its initiatives and programs, STEAM Factory supports diverse scholars from all fields, providing support, academic community, and resources across the entire academic career. STEAM is a network building accelerator and provides benefits to early-career faculty and academics new to Ohio State and eager to form connections across disciplines. Grassroots, faculty and staff-created programs, such as the Behind the Scenes sessions, Racial Justice Pitch event, Racial Justice Facilitated Listening session, monthly book clubs, member happy hours, and weekly writing groups, provide a welcoming, intellectually-rich environment for new faculty. The deep and lasting connections made from these regular and ongoing interactions serve to broaden perspectives, provide crucial interdisciplinary peer mentoring, and support and enhance faculty satisfaction and retention beyond what can be

accomplished through specific research collaborations alone. This is especially important during this global pandemic and interruptions from typical professional and personal lives.

1. **Monthly STEAM Factory Book Club**

STEAM Factory members host a monthly interdisciplinary book club that includes both fiction and non-fiction titles chosen by the monthly volunteer faculty host. Many of these past discussion titles have included topics of anti-racism and represent authors with diverse voices, races, and viewpoints. Recent STEAM book club titles have included: They Can't Kill Us Until They Kill Us by Hanif Abdurraqib, Exit West by Mohsin Hamid, The Song of Solomon by Toni Morison, and How to be an Anti-Racist by Ibrahim Kendi. These informal gatherings, originally in-person and currently virtual, gives the membership an opportunity to connect with other scholars around contemporary and interdisciplinary topics in a lighthearted and meaningful way. These monthly book clubs also provide continuity and common ground and meaningful interactions and help to develop bonds among faculty across widely diverse disciplines.

2. **Weekly STEAM Writing Groups**

STEAM writing groups, like most STEAM programs, came directly from faculty interest, initiative and need. The weekly self-organized writing groups primarily include early career members, tenure track faculty and postdoctoral researchers, who meet weekly in small accountability groups that provide members a specific time to sit and write as well as discuss challenges and insights into their writing process. Participants report that working in these groups has improved both their writing quality and productivity, as well developed organic and cohesive personal and professional connections with colleagues across widely diverse disciplines. Many faculty outside of STEAM have joined these groups after hearing about them from colleagues. The writing group participants handle all the logistics relating to these writing groups as well as establish group process based on participant needs.

3. **Interdisciplinary Postdoc Job Prep and Peer Support Group**

In conjunction with the interdisciplinary Postdoctoral Research program, STEAM Factory's postdoctoral researchers, Dr. Atar Herziger and Dr. Jonathan Stiles, have begun a grassroots postdoc job prep support group for the Fall 2020 and Spring 2021 semesters. Prepping for the academic job market can be stressful and isolating, especially now that the economy and job market have changed so drastically due to COVID-19. Consistent with STEAM's grassroots philosophy, this program was started the way all great STEAM programs start, driven by the initiative and created to address pressing needs of its members. Various resources and opportunities are offered by Ohio State to support postdocs through this process, but few are targeted towards the growing population of interdisciplinary and cross-disciplinary researchers. In this group, post-doctoral researchers and fellows across the university share helpful resources and provide opportunities for getting peer feedback on practice virtual job talks. This program will meet regularly throughout 2020-21 academic year and provides both peer-mentoring and support as well broadens understandings of diverse disciplines and strengthen standings as interdisciplinary researchers. In addition to job talk practice opportunities, this group will host periodic panel discussions and trainings that draw from the diverse STEAM Factory membership.

C. Current Grant Awards and Implementation Efforts

1. **NSF AISL - Convergent Learning from Divergent Perspectives, Interdisciplinary Collaborations in Informal Science Communication**

[NSF-AISL1811119; PI Gopalakrishnan (OSU), co-PI Kajfez (OSU), co-PI Nandi (OSU), co-PI Meyer (COSI); 09/01/2018-08/31/2021 $1,201,312]

STEAM Factory aims to be a leader in research-based outreach that connects scholarly work and creative expression across disciplines. This federally funded grant is the first step towards STEAM realizing this larger goal. This STEAM Factory project, currently in its third year of grant implementation, develops a collaborative program, bringing together researchers with diverse disciplinary expertise to effectively communicate science around convergent themes to inform and engage public audiences of all ages in unstructured and semi-structured learning environments. Society faces a pressing need for public understanding of and engagement with scientific research, including informal interactions with new and cutting-edge research and technology. Through a multi-disciplinary platform of research dissemination, integrating arts and humanities with the social, natural, and mathematical sciences and engineering, STEAM Factory aims to be a bridge between Ohio State scholars and the Columbus community.

The project contributes to advancing knowledge in informal learning by studying short and medium-term learning outcomes across three different informal learning settings:

(i) Franklinton Fridays – Pop-up or incidental learning at research-based presentations to public audiences on a convergent topic from diverse disciplinary perspectives,

(ii) COSI After Dark – Informal learning through presentations on convergent topic at a science museum,

(iii) HSI/O Program – Experiential learning in a semi-structured hackathon environment with creative problem-solving challenges around the common theme for youth of ages 9-18 through schools in local communities. Furthermore, the project advances understanding of interdisciplinary collaborations by studying researcher experiences in collaborative communication and deepens knowledge on the effect of interdisciplinary interactions on motivations and identity as researchers.

The project advances academic and public discourse on collaborative science communication and problem-solving. The project engages directly with youth, young adults, and adults in Franklinton, one of the most economically depressed neighborhoods in the country, to create awareness and participation in scientific discourse. Under this ongoing research project, interdisciplinary training for one postdoctoral scholar, three graduate students and four undergraduate students in cutting-edge interdisciplinary research and data analysis on informal science communication is underway. This research is enabling the study of rich dialogues between researchers and community residents in ways that could fundamentally transform the way education is viewed, blurring lines between formal and informal learning environments. Preliminary findings and early that suggest emergent themes including the impact of communication training, the evolution of interdisciplinary interactions to a convergent idea and the emergence of an educator or mentor identity, have resulted in two conference papers, four academic presentations, development of a data visualization dashboard, creation of an evaluation workbook for pop-up informal science programs and creation of video products for virtual learning.

2. STEAM Factory BETHA Award Implementation

STEAM Factory was awarded a $50,000 BETHA grant in Fall 2020 that allows us to blend storytelling, science, and technology in videos created for public audiences highlighting personal stories and professional accomplishments of scientists at Ohio State. Advancing innovative virtual storytelling capacity within the university is especially timely right now. Using storytelling, professional improvisational comedians, and innovative 360 video camera technology, this project drawing upon the well-established partnership between STEAM Factory, Columbus Science Pub, and Shadowbox will increase the communication skills and public engagement effectiveness of researchers at The Ohio State University.

In October 2020, STEAM hosted two half-day storytelling workshops for STEAM researchers facilitated by The Story Collider, a non-profit organization dedicated to connecting individuals to science through personal stories. Additionally, in partnership with the Story Collider, STEAM will host a live storytelling performance featuring three Ohio State researchers who recently participated in the storytelling training. Using a combination of 360° videography and local professional improvisation comedians, STEAM will partner with faculty across the diverse disciplines to tell their often funny, compelling and substantive behind-the-scenes research stories and showcase laboratories and field sites rarely seen by the public. Additionally, STEAM will develop best practices guidance to expand internal Ohio State capacity for narrative research outreach efforts and virtual public outreach efforts. These scientific stories will be promoted through the variety of well-established mechanisms and will increase the storytelling infrastructure and capacity at Ohio State.

D. STEAM Post-Doctoral Research Annual Updates

This year marks the second-year implementation of the STEAM Factory's inaugural two-year interdisciplinary Post-Doctoral Fellows Program that launched in 2019 by combining university resources from the Sustainability Institute, industry support from Honda Research of America and grant funding from Ohio State Energy Partners. This program allocated funding for two early scholars focused on the following themes: (1) The Future of Mobility & Smart Cities and (2) Sustainable Urban Systems. Applicants were sought whose work included ambitious endeavors, spanned multiple disciplines, connected with research engagement and public outreach and benefitted from working in an urban setting within a multidisciplinary group, rather than in a traditional academic department on campus. Applicants with demonstrated collaborative work that bridged the social sciences with engineering, the natural sciences or humanities were strongly favored in the application process. STEAM postdocs are actively encouraged to develop new collaborative interdisciplinary initiatives and manage ongoing programs at STEAM that further its mission of diverse faculty engagement, collaboration, and research-based outreach.

1. **Jonathan Stiles: Future of Mobility & Smart Cities Post-Doctoral Research-In-Progress**

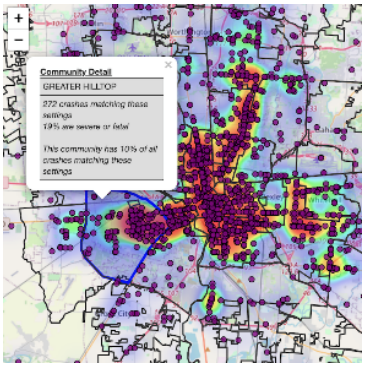
As a STEAM Factory postdoctoral researcher in Mobility and Smart Cities under the supervision of Professor Harvey Miller and Yasuyuki Motoyama, Jonathan Stiles led research projects resulting in two manuscripts submitted for publication, developed an open source software project based on Columbus data and published three peer reviewed articles based on his dissertation research. He also collaborated on an NSF proposal, met with local planning practitioners and shared his research with the Ohio State community.

Stiles' accomplishments and initiatives in the past year include the following:

Two new studies submitted for publication - In his first year, Jonathan developed expertise working with Ohio's traffic crash data, which he applied to two studies set in the Columbus metropolitan area. These studies have now been written up as the following articles and submitted for publication:

- **Lower Volumes, Higher Speeds: Changes to Crash Type, Timing and Severity on Urban Roads from COVID-19 Stay-at-Home Policies**
  In collaboration with Armita Kar, Jinhyung Lee and Harvey Miller; Submitted to transportation journal for a special issue on COVID-19 and travel.
- **The Determination of Fault in Urban Pedestrian Crashes: Assessing the Role of the Built Environment and Neighborhood Inequality**
  In collaboration with Harvey Miller**;** Submitted to city planning journal.

Developed an open source software project based on Columbus data - In his first few weeks in Ohio, Jonathan discovered the crash data for Franklin County using the Smart Columbus Operating System. His efforts to make use of that data ultimately led to the development of the Crash Data Explorer open source project. He was inspired and supported in this effort by members of the Center for Urban and Regional Analysis at Ohio State.



Crash Data Explorer is an open source analysis and engagement tool for urban pedestrian and bike safety. It is a fast client-side JavaScript web application leveraging Leaflet, Chart.js and CitySDK. Its main setup requirement is for traffic crash and boundary data to be converted into specified GeoJSON formats. Sample Python scripts which do this for Columbus Ohio's crash data and geographies are provided with the source code. (http://crashdataexplorer.org/)

Published peer-reviewed articles - Stiles finalized publication of the following papers based on his dissertation research:

Stiles, J., & Smart, M. J. (2020). Working at home and elsewhere: Daily work location, telework and travel among United States knowledge workers. *Transportation*, 1-31.

Stiles, J. (2020). Strategic niche management in transition pathways: Telework advocacy as groundwork for an incremental transformation. *Environmental Innovation and Societal Transitions*, 34, 139-150.

Stiles, J., & Andrews, C. (2019). Powers of Division: "Smart" Spaces as Controlling Workplace Activity Fragmentation. *Annals of the American Association of Geographers*, 1-11.

Other collaboration and dissemination - In addition to his major initiatives, Stiles shared his knowledge and learned from others in the following ways:

- Presented on traffic safety at a STEAM Factory Franklinton Friday event
- Guest lectured on information technology and travel for an Ohio State Transportation Geography class
- Co-developed programming for interdisciplinary scholars (in collaboration with Herziger, see further description below in section on Herziger's initiatives)
- Participated in proposal development and planning new projects with mentors
- Participated in a working group for the Columbus Vision Zero initiative
- Participated in various meetings with state and local planning/transportation agencies including MORPC, ODOT, City of Columbus, Smart Columbus

Planned upcoming projects - Stiles' projects planned for his second year in collaboration with Professor Harvey Miller and others include:

- A research case study on the implementation of the Smart Columbus project
- New mobility analyses using data and tools from a recently developed Honda 99p Lab developer platform
- Research into the ongoing effects of COVID-19 on travel in the Columbus metropolitan area and at Ohio State
- Continued research on traffic safety in Ohio, in light of the ongoing Columbus Vision Zero initiative

2. Atar Herziger: Sustainable Urban Systems Post-Doctoral Research-In-Progress

Dr. Atar Herziger is a STEAM Factory postdoctoral researcher in Sustainable Urban Systems. Atar joined Ohio State in 2018 as a postdoctoral researcher in Behavior and Sustainability at the School of Environment and Natural Resources and the Sustainability Institute (then, the Sustainable and Resilient Economy Discovery Theme), with Dr. Jeremy Brooks, a STEAM member, as her primary mentor. Through joining the STEAM Factory's Interdisciplinary Postdoctoral Research Program in January 2020, Herziger broadened her network of co-authors and mentors to include Dr. Andre Carrel from the department of Civil, Environmental and Geodetic Engineering as well as Dr. Gulsah Akar from Knowlton School's City and Regional Planning Program; both are STEAM members. These collaborations have afforded her the opportunity to apply her expertise in consumer psychology to the transportation sector and have assisted Drs. Carrel and Akar in integrating a psychological perspective into their behavioral research. She has published four articles and submitted another article this year.

Herziger's accomplishments and initiatives in the past year include the following:

Progress on collaborative research - Herziger has been working with Drs. Akar, Carrel and Brooks on several research projects examining the influence of Smart Cities on sustainable transportation behavior and residential well-being. This research is funded by Ohio State as well as Smart Columbus ($348,726). Due to the COVID-19 outbreak, this research has additionally incorporated goals of assessing the influence of risk perception and changing travel needs on behavior change, sustainable travel and well-being. These research projects are the first collaborations between Drs. Akar, Carrel and Brooks and have been led and facilitated by Herziger's work.

Published peer-reviewed articles

Wilson, R. S., Herziger, A., Hamilton, M., & Brooks, J. S. (2020). From incremental to transformative adaptation in individual responses to climate-exacerbated hazards. *Nature Climate Change*, 10(3), 200–208.

Herziger, A., Berkessel, J., & Steinnes, K. K. (2020). Wean off green: On the (In)effectiveness of biospheric appeals for consumption curtailment. *Journal of Environmental Psychology*, 69(May 2019), 101415.

Herziger, A., Claborn, K. A., & Brooks, J. S. (2020). Is There Hope for the Double Dividend? How Social Context Can Shape Synergies and Tradeoffs between Sustainable Consumption and Well-Being. *Ecological Economics*, 176, 106736.

Ozanne, L., Luchs, M., Mick, D., Stornelli, J., Bayuk, J., Birau, M., Chugani-Marquez, S., Fransen, M., Herziger, A., Komarova, Y., Minton, E., Reshadi, F., Sullivan-Mort, G., Trujillo, C., Bai, H., Dhandra, T., & Zúñiga, M. Enabling and Cultivating Wiser Consumption: The Roles of Marketing and Public Policy; Conditionally accepted to *Journal of Public Policy & Marketing*.

Submitted peer-reviewed articles

Herziger, A. & Sintov, N.; Marketing Products vs Identities: Identity Based Motivation in Electric Vehicle Adoption; Submitted to *Journal of Environmental Psychology*.

Grants awarded

Co-Investigator on "Increasing the use of Reverse Vending Machines through Consumer Empowerment"; The Coca-Cola Company ($667,691)

Other collaboration and dissemination - Initiation of a university-wide peer group for interdisciplinary postdoctoral scholars on the 2020-2021 job market[14] alongside fellow STEAM Factory postdoc, Jonathan Stiles (kick off program held on Oct 16, 2020)

[14] https://steamfactory.osu.edu/programs/interdisciplinary-postdoc-job-prep-peer-group

Section IV

Where We Are Going: Future Priotities and Initatives

STEAM Factory accepts the challenge of becoming the hub for groundbreaking interdisciplinary collaborations and dissemination at Ohio State.

From its inception, STEAM Factory has been fostering creativity, sparking connections, and bringing intellectually astute researchers together to talk, learn, grow and create together. We envision becoming a unique STEAM Institute that hosts networks of top-tier Ohio State scholars as they engage with each other around broad cross-cutting themes based on state and local community-identified problems. STEAM Factory will house this convergence institute within its existing grassroots and rotating leadership structure and support integration of scholars from diverse disciplines and backgrounds that provide the foundation of engaged research, deep collaborations, and opportunities for community engaged participatory action and industry engagement in the State of Ohio.

Building on STEAM's unique strengths, the Institute will:

- continue to support and increase existing STEAM Factory programs and culture, which have demonstrated success in engaging and connecting diverse faculty, staff, and partners.
- support scholars of all disciplines to work together on these cross-cutting themes of vital state and local interest.
- provide a forum for research, collaborations and community and industry engagement among scholars, with locations in the historic downtown Franklinton neighborhood and housed within the future West Campus Innovation District.
- successfully apply for and manage external funding to support the Institute's fellows, associated scholars, and programs, assisted by a full-time Research Development Director.
- continue to support arts, humanities, social and behavioral science endeavors as well as traditional STEM fields with funding opportunities for fellows and other scholars and artists in residence.

For faculty, the Institute will provide opportunities to re-envision their scholarship, to better address locally relevant problems and to deepen their connections across disciplines. Temporarily released from the regular responsibilities of their academic units, residents of the Institute will remain committed to addressing our state's pressing problems and furthering the public mission of Ohio State University. This process requires time and engagement with scholars across disciplines, which is achieved through novel course release programs as well as sabbaticals. Postdoctoral scholars, graduate and undergraduate students will be partners in both scholarship and engagement with the community. Our programming will connect scholars across campus and engage the larger public in the ambitious, illuminating, and transformative work of the artists and scholars we serve. We will offer regular academic programming—including research seminars, public lectures, symposia, and conferences—based on current thematic areas of research of fellows.

A. Develop a pilot interdisciplinary faculty peer mentoring program

Peer networking is a cornerstone within the culture of STEAM. In STEAM, peer mentoring happens naturally and almost effortlessly based on relationships created through everyday interactions and formal and informal initiatives. The University is allocating increased resources on enhanced mentoring efforts, and some colleges have well-established, discipline focused mentoring. This program seeks to complement these university-wide efforts and create a pilot interdisciplinary faculty peer mentoring program primarily focusing on early career faculty and utilizing post-tenure, near-peer STEAM faculty members.

This effort will build upon the ongoing collaboration between STEAM Factory, Kirwan Center for Race and Ethnicity, and Ohio Campus Compact on racial justice, diversity, equity, and inclusion as described above. STEAM is trusted convenor among Ohio State faculty that benefits from grassroots faculty support in which members self-select to be a part of the group. It provides a safe-to-fail environment where risk-taking is encouraged. This interdisciplinary peer mentoring initiative will recreate the organic relationship building and community bonding that STEAM originally grew from and that continues to arise organically through STEAM's membership, community, and programs. It seeks to reimagine an essential function of mentoring' across the university and would include a diverse disciplinary mix of peers (individuals who are in similar placement within their careers) and near-peers (individuals who are one step ahead in the anticipated career trajectory) as mentors and participants.

Planned components of the peer mentoring pilot curriculum would include the following:

- Monthly modular seminars, panel discussions, trainings with topics to include research interests, early career leadership training, conflict resolution as well design process focused learning labs, adaptive strategies, and self-care components.
- Development of early career small cohort groups. These interdisciplinary peer mentoring cohorts are intended to replicate the organic bonding, peer support, affinity and cohesion that results from participation in the formal and informal programs including writing groups, book clubs, STEAM Exchanges, NSF convergent research cohorts, etc.
- Integration into existing core formal and informal faculty engagement, anti-racism diversity initiative and public outreach programs that further STEAM's vision and develop capacity for convergent knowledge sharing and co-production, trust, relationship building, reflection, and curiosity. These will include integration into STEAM's existing social, community-building, networking, professional development, and informal mentoring opportunities.

Goals of STEAM Peer Mentoring Program:

- STEAM will weave peer mentoring efforts into STEAM/Kirwan/Campus Compact anti-racism micro-credentialling efforts so that diversity, equity, leadership, and service work can be tracked and used in support for promotion and tenure packages.
- STEAM's interdisciplinary peer mentoring program creates a diverse academic network for "new" faculty immediately upon arrival at Ohio State.
- Pilot program would follow a control group of faculty as well as a cohort receiving the peer-mentoring intervention and could provide a long-term opportunity for convergent research on the faculty impact of this innovative curriculum. Great care would be taken to identify faculty researchers who develop research and evaluate this program.

- STEAM's interdisciplinary peer mentoring would provide rare and vital leadership and mentoring skills and opportunities for early career faculty.
- Provides a professional and personal support network for new faculty across a large university, including virtually, something that could prove increasingly valuable given the large scale on-campus/in-person disruptions under COVID-19.

B. Develop Team Science and Wicked Scientist STEAM Courses for Graduate Students

For years, STEAM has considered the type of student coursework that might find a home in its walls. The broadly diverse STEAM ecosystem and engaged members provide unique educational wisdom and opportunities for students. To date, STEAM has not had the capacity to focus efforts on this student facing effort. However, the transition away from physical programs has given STEAM the opportunity to work with faculty members on developing a couple of transformative and unique student offerings.

STEAM Factory will work closely with identified faculty members to develop both a transdisciplinary graduate TEAM Science course and Wicked Scientist curriculum that will be available to all graduate students at Ohio State. These proposed interdisciplinary graduate courses seek to pilot, test, and implement a program that trains graduate students to become wicked scientists – researchers who have the capacity to tackle the grand challenges of today and tomorrow. Currently, there are few programs that train scientists to tackle these grand challenges in transdisciplinary teams. This program trains graduate students from all disciplines to tackle wicked problems, such as adaptation to climate change, food insecurity, growing inequality, cyber security, systemic racism, and emerging infectious diseases. To effectively address such grand challenges, STEAM Factory proposes graduate students need to be experts in their respective fields, but they also need the transdisciplinary skills to collaborate successfully with researchers and other stakeholders. This program seeks to develop the skills that enable transdisciplinary teams to be inclusive and successful; and (2) participation in a community of practice of diverse students, faculty and other stakeholders that foster long-term professional development of wicked scientists.

Among other anticipated learning outcomes, graduate students who complete these courses should:

- Understand the history of TEAM Science and Wicked Problems
- Know the skills necessary for participating in an interdisciplinary team;
- Improved communication and interdisciplinary communication skills;
- Explored the steps to building an interdisciplinary team;
- Understand the traits of successful interdisciplinary teams;
- Have developed leadership skills useful in interdisciplinary teams;
- Created and developed a completed collaboration plan;
- Be familiar with techniques for resolving conflicts and having difficult discussions;
- Explored collaborations with different types of organizations (e.g., industry, government, stakeholders, humanities); and
- Be able to reflect on and assess team practices to determine success and impacts.

C. Establish a satellite STEAM Factory location in the West Campus Innovation District

Develop a satellite STEAM Factory location in the Innovation District as a Gateway to Innovation between the University, industry, and community. This satellite location would support existing efforts in Franklinton dedicated to creativity, discovery, and collaboration and further enhance connections with industry. The space would also provide opportunities for local sabbaticals, providing space and

opportunity for local pre- and post-tenure faculty. The near-campus location lying within the newly created Innovation District creates a space and culture that is ripe for innovation. Facilitating core programs here will bring academic, industry, and community leaders together for vital conversations needed to develop the solutions to our pressing challenges. This space would also provide increased coworking capacity, greater internal accessibility, a centralized location and increased accessibility for faculty, students, industry partners, and the broader community. The STEAM Factory Gateway location would support existing and future efforts as the physical representation of our unique position, having one foot in academia and one foot in the community.

D. Establish STEAM Powered Fellowships, "Choose Your Own Adventure" Funding:

A STEAM Powered Fellows funding opportunity would provide small amounts of funding for a wide variety of interdisciplinary collaborations that meet the needs of academics across their career paths. This program would be modeled after the successful STEAM Powered Projects, providing researchers the opportunity to pilot creative and high-impact research, teaching, and community engagement work. STEAM Factory envisions these small dollar grants would be matched by additional funds or in-kind contributions depending on availability and the nature of the fellowship. This would allow members to explore new directions with the potential to attract external funding and expand research frontiers. Examples of the types of fellowships include the following:

- Stipends for transitions from national and international research to locally focused research,
- Support for early-career sabbaticals that allow scholars to reimagine research priorities,
- Support for artists in residence who are eager to work with interdisciplinary faculty,
- Re-envisioning scholarly pathways for mid to late-career faculty/staff,
- Funding and opportunities for a spectrum of community-facing programming to community engaged participatory research opportunities.

Programmatic support for students and postdoctoral scholars will further amplify the new research directions being forged by STEAM fellows. Programming will include interdisciplinary peer mentoring for trainees, interdisciplinary undergraduate thesis projects and capstone projects, and the opportunity for graduate students and postdoctoral scholars to develop and implement outreach and community-based dissemination initiatives.

E. In Conclusion

These foundational efforts are deeply entwined with Ohio State strategic goals and complementary to the amazing resources within this institution. STEAM Factory exists as an experiential living lab for the university of the future and blends the expertise, wisdom and knowledge of widely diverse academic disciplines, research and education based on existing and emerging critical and complex societal needs with a deep sense of community and purpose.

STEAM Factory envisions a university ecosystem that is inclusive, reflective, intentional, and quickly activated across broadly diverse disciplines and stakeholder to address complex and evolving societal needs. This further allows for fostering of curiosity, building skills and capacities that empower faculty, staff, students, and the broader community in transformative, powerful, and rewarding collaborative work that expands beyond academic walls to the entire planet. STEAM seeks the amplification and understanding of diverse backgrounds and perspectives that are foundational to the development of innovative research-based solutions, educational practices, knowledge creation, actions and interventions to the most pressing problems in ways that create an equitable, healthy, just and sustainable population and planet. STEAM Factory wants a new and better world and sees that it is possible.

Section V

STEAM Factory | 2014-2020 Outcomes/Impact Scorecard

Faculty Outcomes						
Objectives	**Measures**	**Total**	**ASC**	**Engineering**	**CFAES**	**Others**
Secure Competitive Grants	Proposals Submitted with STEAM Factory Letter of Collaboration	100	63	31	7	7
	Proposals Funded	35	23	7	3	4
	Dollars raised with STEAM Factory Letter of Collaboration	$12,621,612	$7,173,587	$3,360,137	$862,888	$1,225,000
Interdisciplinary Collaborations	STEAM Exchanges Organized	41	n/a	n/a	n/a	n/a
	Faculty Participation (Presenters)	103	59	13	13	18
	Faculty Participation (Attendance incl. non-STEAM members)	441	127	56	38	262

Outreach and Engagement						
Objectives	**Measures**	**Total**	**ASC**	**Engineering**	**CFAES**	**Others**
Expand outreach & engagement	Outreach events	107	n/a	n/a	n/a	n/a
	No. of people reached	18500+	n/a	n/a	n/a	n/a
	Average attendance at Franklinton Fridays	250	n/a	n/a	n/a	n/a
	No of University, government and community events at STEAM Factory space use	406	n/a	n/a	n/a	n/a

University Outcomes						
Objectives	**Measures**	**Total**	**ASC**	**Engineering**	**CFAES**	**Others**
Recruit superior talent	No. of members	219	110	36	21	52
Achieve diversity	Colleges Represented	13	n/a	n/a	n/a	n/a
	Departments represented	65	29	9	10	17
	Women representation	52%	42%	53%	62%	67%
Demonstrate Leadership	No. of members with NSF Early career awards	13	5	7	1	-
	No. of members with research/teaching awards	29	11	6	2	10
Interdisciplinary collaboration	STEAM Powered Projects (SEED grants)	13	14	2	4	2
	No. of disciplines involved in STEAM Powered Projects	22	12	3	3	4