

Facilitating a Culture of Interdisciplinary Collaboration

THE STEAM FACTORY

RESEARCH | INNOVATION | COLLABORATION | DISSEMINATION | EDUCATION

2014

Comprehensive Report

2017

WELCOME TO THE STEAM FACTORY,

OHIO STATE'S GRASSROOTS INTERDISCIPLINARY COLLABORATION FACILITATOR IN COLUMBUS!

What we have accomplished in four years is remarkable. From a group of 10 faculty in 2012, The STEAM Factory has organically grown into a network of 170 members spanning over 80 departments at Ohio State. It has become the single most diverse cross-section of the university's world-class work force of academics. We work together to:

- foster and facilitate interdisciplinary collaboration
- break the town and gown barrier
- exemplify the land grant mission of the Ohio State University
- support ongoing partner efforts to cultivate a Franklinton arts and innovation hub
- form an important outreach model for universities across the world

I am excited to take on a new role this year as the Chair of The STEAM Factory. At the outset, I want to thank Roman Holowinsky, Associate Professor in Mathematics and Co-founder of The STEAM Factory, for his tireless toil over the past four years to build this truly incredible network at Ohio State. We could not have gained a reputation of being such an innovative and creative grassroots organization without the Roman's conviction and strong leadership.

Our programs to engage cross-disciplinary research discussions (STEAM Exchange) and to provide a platform for multi-disciplinary research dissemination (Franklinton Fridays) continue to be stimulating and inspiring. STEAM Factory faculty are engaged in over 50 ongoing collaborations that are making impactful contributions in research, teaching and outreach. We are excited to see 6 new projects funded this year. Thanks to Sam White, Director of University Involvement; Jim Fowler, Director of Outreach; and Jim Chen, Director of Grants and Funding, for providing leadership in running these programs.

Another transition in leadership this year is in the role of Director for Collaborative Research. I want to thank Arnab Nandi, Associate Professor of Computer Science and Engineering and a co-founder of The STEAM Factory, for his leadership in this role over the past 3 years. I am excited to welcome Lisa Hall, Assistant Professor in Chemical & Biomolecular Engineering and a founding member of The STEAM Factory into this role, and am looking forward to her new ideas and initiatives.

I want to also call to attention the outstanding efforts of Charlene Brenner in coordinating and managing all our programs and initiatives. The STEAM Factory has evolved into a space that invites scholars from very diverse disciplines, who work together engage in conversations and ideas that push traditional boundaries, and this collaborative space is the result of Charlene's hard work. I invite you use the space and share your ideas for new programs, and improving our current programs.

Our members continue to excel in their respective departmental responsibilities of research, teaching and service. The STEAM Factory's work is being voluntarily done by some of Ohio State's top employees during the early morning, late evening and weekend hours, all because our members understand the strength, impact, and importance of combining diverse resources and expertise in trying to solve humanity's

greatest problems. Creating a culture of interdisciplinary collaboration requires a bottom-up initiative with top-down support. **The STEAM Factory is the bottom-up solution to creating a culture of interdisciplinary collaboration within the University system.**

The STEAM Factory is constantly growing and expanding its reach. We are excited about all of the things we have yet to learn from our new colleagues, friends and partners, the innovative learning prospects for our students and the growing engagement with the public. Academic culture at Ohio State is already changing, recognizing the power of formal and informal interaction among its brightest faculty, and with the Columbus community. We invite you to take a deeper look at what we have accomplished over the past years as well as the ways we intend to open new avenues for interdisciplinary collaboration in the future.

Sincerely,

Sathya Gopalakrishnan,
Associate Professor, Department of Agricultural, Environmental, and Development Economics
Chair of The STEAM Factory

EXECUTIVE SUMMARY

By inviting scholars with diverse perspectives, experiences, and areas of expertise into shared conversations and collaborations, the STEAM Factory facilitates a culture of collaboration.

The STEAM Factory cultivates an environment of collaborative idea-sharing that serves as a model for inspiring innovation among faculty for developing collaborations among academics and translating research to the general public. Since our founding in December 2012 by a core group of 10 Ohio State faculty, postdocs, and staff, the STEAM Factory has developed both a culture and community of interdisciplinary collaboration. Our **170 members** from **90+ departments** and fields of study engage with other STEAM Factory to share resources, spark research initiatives, and ultimately, helps bridge the gap between academic units at Ohio State and business professionals, entrepreneurs and the wider Columbus community. The STEAM Factory's grassroots approach to developing programs for interdisciplinary collaboration within Ohio State's diverse academic network, and increasing public understanding of academic insights within our broader community, enables high impact with low cost.

The shared vision of our work is to foster diverse and interconnected research practices within the university workforce. This STEAM Factory annual report covers the progress of our programs from 2016 and 2017 as well as the broader impacts of interdisciplinary collaboration. In the past year, The STEAM Factory has achieved its goals by continuing to develop and fuel research initiatives, including STEAM Powered Projects, STEAM Exchanges, and outreach events. The following highlights reflect the programming accomplishments that have compelled faculty, students, and community participants to innovate across diverse research disciplines and increase the public impact of Ohio State research.

FOSTERING A CULTURE OF COLLABORATION

The STEAM Factory space at 400 West Rich Street provides a platform for a new academic culture of collaboration where faculty, students, and community members convene together in one place. Here, members have the space to interact with faculty members from a broad range of disciplines. Unplanned and unexpected conversations about research methods and various disciplinary approaches to problem solving are very common, and these conversations potentially spark new research ideas. It is in this way that the intentionally designed, multi-functional STEAM Factory co-working space contributes to the success of our programming. Invitation into the space extends beyond Ohio State faculty and to the community at large. Last year we hosted over **180 outreach events** in our space, including roundtables, workshops, classes, faculty and student research showcases.

In the past three years, our events have attracted over **18,000 attendees** to learn alongside each other. We invited over **70 faculty and postdoctoral presenters** representing more than **35 academic disciplines, who shared their research at the STEAM Exchange**. The STEAM Factory recognizes the importance of synergies between the arts and the sciences, inviting undergraduate and graduate students from across the disciplines to present at STEAM outreach activities. Since December 2015, The STEAM Factory hosted **17 Franklinton Friday** open houses and over **130 students have been engaged in**

STEAM Factory outreach events, bringing community members and business professionals in to learn about the latest in Ohio State research and innovation. Franklinton Fridays, held on the second Friday each month, are a rich opportunity for community and STEAM members to explore neighborhood-wide collections of art, music, and food. It is through the combined work of research, education, artistic expression, and community involvement that the STEAM Factory continues to facilitate a multi-faceted culture of collaboration.

TRANSLATING RESEARCH TO ACADEMICS AND THE BROADER COMMUNITY

One of the many essential outcomes of interdisciplinary and collaborative work at the university level is the translation of impactful research to public audiences. The STEAM Factory facilitates collaboration and leadership amongst faculty by providing opportunities to share new research discoveries through STEAM Exchanges, and seed new collaborations through STEAM-Powered Projects.

STEAM Exchanges

The STEAM Factory monthly seminars, called STEAM Exchanges, bring faculty together over a themed topic to offer unique perspectives and identify opportunities for collaboration. The time and space created through these exchanges create the opportunity to discuss current research endeavors, often in an intimate environment of 40 to 50 members. In these lively conversations resources are shared, and research and teaching methodologies are transferred across disciplines. Throughout our short but impactful history, we've hosted **29 STEAM Exchanges** with **70 faculty** presenters from **48 disciplines** with average attendance over 30 people per event. Interdisciplinary STEAM Exchange topics included climate change, conflict, progress, blood, bias, and preservation, to mention a few.

STEAM Powered Projects

Our seed-funding program, called STEAM Powered Projects, supports members to launch new collaborative projects. The program, much like STEAM Factory itself, defies convention by specifically supporting collaborations that benefit the STEAM Factory membership as a whole but which may not be easily funded by traditional sources. So far, this program has contributed to the innovative efforts of its members by obtaining funding for **13 interdisciplinary projects** in research, teaching, and outreach with a total award amount of **$81,693**. These funds have been distributed to **29 Ohio State faculty** members representing **22 disciplines** and resulted in projects that distinguish themselves with original thought dedicated to pioneering research.

The STEAM Powered Projects micro grant program, implemented in 2016, include the Buckeye Virtual Reality Project, where members developed virtual reality visualizations of STEM (Science, Technology, Engineering and Math) concepts that are used with Google Cardboard glasses to help bridge the instructor's mental picture and the student's. The Harnessing Ecosystem Services Project was also designed through a STEAM Powered grant to promote policies that protect critical urban ecosystem structures and functions, especially for low-income households who often face food insecurity and limited means of compensating for lost ecosystem services. Another notable project is Big History, which is a course that provides a consilient, non-technical introduction to the essential state of knowledge about the galaxy, planet, life, and humanity.

BUILDING VALUE

Our culture of collaboration, inviting STEAM Factory space, and translation of research to public audiences extend rich opportunities that result in high engagement and retention of OSU faculty members. In addition to multi-faceted and cross-disciplinary engagement, the STEAM Factory offers an avenue for faculty members to participate in outreach, share research findings, and enhance the broader impact of federally funded research grants. The STEAM Factory has provided support and letters of collaboration for **70 research proposals**, and STEAM Factory faculty members have been awarded nearly **$9.3 million in grants** in the past year. Additionally, **12 STEAM members** have been awarded NSF Early CAREER Awards.

The profound value the STEAM Factory offers to the range of individuals that participate in its programming builds upon itself with broader university and community impacts. Over **180 outreach events** have been hosted in our space along with a total of **38 collaborative interdisciplinary research projects** representing **22 disciplines**. Our progress over the past four years goes beyond inviting new opportunities for innovative learning, and into a significant cultural shift toward embracing diversity of thought and discipline to better our academic pursuits and community relationships. We are extraordinarily excited to see what the future brings.

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MISSION, VISION, VALUES, AND HISTORY

OUR MISSION

To facilitate a culture of interdisciplinary collaboration

OUR STORY AND PURPOSE

Founded in December 2012 by a collection of young, energetic Ohio State faculty, postdocs and staff, The STEAM Factory is a diverse and inclusive grassroots network in the Ohio State community that facilitates creative and interdisciplinary collaboration, innovation, outreach and education.

OUR GOALS

- Support opportunities for collaboration
- Enhance and drive innovation across all research disciplines
- Provide linkages and interdisciplinary interactions among university departments and colleges
- Increase the public awareness, understanding, and impact of Ohio State research

OUR FUNCTION

The twin cores of STEAM Factory activity are **Collaboration** and **Dissemination**.

- COLLABORATION: The STEAM Factory provides a space where researchers from all disciplines can broaden their perspectives, share resources, spark creative research ideas, and form collaborations across areas of common interest.

  Both formal and informal activities help members to:

  - Share research skills, pedagogical resources, equipment and grant writing opportunities
  - Learn about current research questions and opportunities for collaboration across all disciplines through a variety of stimulating interactions and activities
  - Find support for establishing collaborations via seed funding, proposal development assistance, and links to other resources

- DISSEMINATION: The STEAM Factory helps to bridge the gap between Ohio State and the Columbus community through research dissemination and outreach that is accessible and approachable by combining formal and informal learning. Finding creative ways to reach and engage the Columbus community, such as the Franklinton Friday Open Houses at 400 West Rich, accomplishes the following:
    - Increases public impact of academic research by reaching a demographic typically inaccessible via traditional on-campus methods
    - Establishes connections across all disciplines
    - Encourages critical feedback on research in progress from community members and colleagues
    - Provides a channel for promoting and raising awareness of the work done by individual members, the STEAM Factory, and the greater Ohio State community

STEAM MEMBERS 2016 - 17

- **Alex Oliszewski,** Assistant Professor, Theatre and ACCAD
- **Alia Dietsch**, Assistant Professor, Environment and Natural Resources
- **Alvaro Montenegro,** Assistant Professor, Geography
- **Amanda Folk,** Assistant Professor, Teaching & Learning, University Libraries
- **Amul Tevar,** Staff, Ohio State-Battelle Joint Appointee
- **Amy Youngs**, Associate Professor, Art
- **Andrew Frueh,** Lecturer, Art
- **Anna Dobritsa,** Assistant Professor, Molecular Genetics
- **Anna Gawboy,** Associate Professor, Music
- **Anne Co,** Associate Professor, Chemistry and Biochemistry
- **Annie Specht,** Assistant Professor, Agricultural Communication, Education and Leadership
- **Ari Glogower,** Assistant Professor, Law
- **Arnab Nandi,** Associate Professor, Computer Science Engineering
- **Arnulfo Perez,** Assistant Professor, Mathematics
- **Asimina Kiourti,** Assistant Professor, Electrical and Computer Engineering
- **Ayaz Hyder**, Assistant Professor, Environmental Health Sciences
- **Barbara Wyslouzil,** Professor, Chemical & Biomolecular Engineering, Chemistry and Biochemistry
- **Bart Snapp,** Auxiliary Assistant Professor, Mathematics
- **Bernadette Hanlon,** Assistant Professor, City and Regional Planning
- **Bruce Ackley,** Extension Program Specialist – Weed Science, Horticulture and Crop Science
- **Carolin Fink,** Assistant Professor, Material Science and Engineering
- **Catherine O'Keefe,** Instructional Designer, Pharmacy
- **Charlene Brenner,** Project Coordinator, STEAM Factory
- **Chris Hill,** Lecturer, English as a Second Language Program
- **Chris Orban**, Assistant Professor, Physics
- **Christina Archer,** Instructional Designer, Pharmacy
- **Christine Charyton,** Adjunct Assistant Professor and Visiting Assistant Professor, Neurology
- **Chuan Xue,** Assistant Professor, Mathematics
- **Courtney Heppner,** Director of Corporate Engagement, Corporate Engagement Office
- **Daniela Miteva,** Assistant Professor, Agricultural, Environments and Development Economics
- **David Penneys,** Assistant Professor, Mathematics
- **David Sivakoff,** Assistant Professor, Statistics
- **David Staley,** Associate Professor, History
- **Deborah Kuzawa,** Senior Lecturer, Engineering Education
- **Dmitri Kudryashov,** Assistant Professor, Chemistry & Biochemistry
- **Donald Hubin**, Professor, Philosophy
- **Dustin Mixon,** Assistant Professor, Mathematics
- **Eddie Pauline,** Director of Business Development, Office of Economic and Corporate Engagement

STEAM MEMBERS 2016 - 17

- **Elizabeth Kirby,** Assistant Professor, Psychology
- **Elliot Bendoly,** Professor, Management Sciences
- **Emily Shaw,** Assistant Professor, Head of Preservation and Reformatting
- **Eric England,** Assistant Professor, Animal Sciences
- **Eric Katz,** Assistant Professor, Mathematics
- **Frances Sivakoff**, Post-Doctoral Researcher, Entomology
- **Ghaith Hiary,** Assistant Professor, Mathematics
- **Giorgio Rizzoni,** Professor, Mechanical and Aerospace Engineering, and Electrical and Computer Science Engineering
- **Harmony Bench,** Assistant Professor, Dance
- **Harvey Miller,** Professor, Geographic Information Science
- **Hilary Bussell,** Assistant Professor, Research Services
- **Huan Sun,** Assistant Professor, Computer Science and Engineering
- **Jason Cervenec,** Education and Outreach Director, Byrd Polar and Climate Research Center
- **Jason Coronel,** Assistant Professor, Communication
- **Jeff Bielicki,** Assistant Professor, Civil Engineering, Geodetic Engineering
- **Jeff Agnoli,** Education, Funding and Research Development, Office of Research
- **Jennifer Herman,** Senior Lecturer, Engineering Education
- **Jennifer Schlueter,** Associate Professor and Associate Chair, Theatre
- **Jennifer Sinnott,** Assistant Professor, Statistics
- **Jennifer Suchland,** Associate Professor, Women's Gender and Sexuality Studies and Slavic and East European Languages and Cultures
- **Jesse Fox,** Associate Professor, Communication
- **Jesse Kwiek,** Assistant Professor, Microbial Infection and Immunity
- **Jessica Logan**, Assistant Professor, Education and Human Ecology
- **Jim Chen,** Assistant Professor**,** Biomedical Informatics, Internal Medicine and Medical Oncology
- **Jim Fowler,** Assistant Professor, Mathematics
- **John Beacom,** Professor, Physics, Astronomy, CCAPP
- **John Pieper,** Administrative Manager, Mathematics
- **Jonathan Brown**, Research Scientist/Lecturer, Chemical and Biomolecular Engineering
- **Jonathan Song,** Assistant Professor, Mechanical Aerospace Engineering
- **Joshua Goldberger,** Assistant Professor, Chemistry and Biochemistry
- **Julie Carpenter-Hubin,** Assistant Vice President, Institutional Research and Planning
- **Julien Nicolas,** Research Associate, Byrd Polar and Climate Research Center
- **Kareem Usher,** Assistant Professor, City and Regional Planning
- **Karen Dannemiller**, Assistant Professor, Civil, Environmental and Geodetic Engineering, Environmental and Health Sciences
- **Karl Whittington,** Associate Professor, History of Art
- **Katherine O'Brien,** Contracted Teaching Assistant, CLSE Education

STEAM MEMBERS 2016 - 17

- **Kathryn Campbell-Kibler,** Associate Professor, Linguistics
- **Kathryn Kelley**, Director, Ohio Manufacturing Institute, Engineering
- **Kathy Malone,** Assistant Professor, Science Education
- **Katie Walton,** Assistant Professor, Psychology, Nisonger Center
- **Keith Warren**, Associate Professor, Social Work
- **Kelly Purtell**, Assistant Professor, Human Sciences
- **Ken Rinaldo**, Professor, Art, Art & Technology
- **Kim Landsbergen,** Visiting Research Scholar, Evolution, Ecology and Organismal Biology
- **Kip Curtis,** Assistant Professor, History
- **Laura Wagner,** Associate Professor, Psychology
- **Lauren Jones,** Assistant Professor, Human Sciences
- **Lauren Squires,** Assistant Professor, English
- **Leah E.M. Bevis,** Assistant Professor, Agricultural, Environmental, and Development Economics
- **Leonardo Carrizo**, Lecturer, Communication
- **Leslie C. Moore,** Associate Professor, Teaching and Learning
- **Linda Carpenter,** Assistant Professor, Physics
- **Lisa Hall,** Assistant Professor, Chemical and Biomolecular Engineering
- **Lise Worthen-Chaudhari,** Assistant Professor, Physical Medicine and Rehabilitation
- **Liz Sanders,** Associate Professor, Design
- **Liz Vivas,** Assistant Professor, Mathematics
- **Manoj Srinivasan,** Associate Professor, Mechanical Aerospace Engineering
- **Marcello Canova,** Associate Professor, Mechanical and Aerospace Engineering, Associate Director for Graduate and Continuing Education, Center for Automotive Research
- **Marium Husain,** Assistant Professor, College of Medicine
- **Mark Rudoff,** Associate Professor, Cello and Chamber Music
- **Mary Gardiner,** Associate Professor, Entomology
- **Mary Tarantino**, Professor, Theatre
- **Matt Kahle,** Associate Professor, Mathematics
- **Maurice Stevens,** Associate Professor, Comparative Studies
- **Melissa Crum**, Adjunct, The Barnett Center for Integrated Arts and Enterprise
- **Meris Mandernach,** Associate Professor, Head of Research and Education
- **Mike Bond,** Associate Professor, Computer Science Engineering
- **Mindi Rhoades**, Assistant Professor, Teaching and Learning
- **Monique T. Mills,** Associate Professor, Speech & Hearing Science
- **Nancy Santagata**, Visiting Scholar, Chemistry
- **Nicole Nieto,** Program Manager, Office of Research
- **Nicole Sintov,** Assistant Professor, Environment and Natural Resources
- **Nikole Patson,** Associate Professor, Psychology
- **Niles Johnson,** Assistant Professor, Mathematics

STEAM MEMBERS 2016 - 17

- **Norah Zuniga Shaw,** Professor, Dance
- **Oksana Chkrebtii**, Assistant Professor, Statistics
- **Paul Sutter,** Cosmological Research and Community Outreach Coordinator, CCAPP and Chief Scientist at COSI
- **Pierluigi (Enrico) Bonello,** Professor, Plant Pathology
- **Psaras McGrier,** Assistant Professor, Chemistry and Biochemistry
- **Rachel Kopec,** Assistant Professor, Human Sciences
- **Rafat Amer,** Assistant Professor, Dentistry
- **Rick Voithofer,** Associate Professor, Educational Policy and Leadership
- **Rob Pyatt,** Associate Professor-Clinical, Pathology
- **Roman Holowinsky,** Associate Professor, Mathematics
- **Ryan Harne,** Assistant Professor, Mechanical and Aerospace Engineering
- **Sam White,** Associate Professor**,** History
- **Samantha Frost,** Director, Advancement Events
- **Sandra Enimil,** Program Director, University Libraries, Copyright Resources Center
- **Sanjeevi Krishnan**, Assistant Professor, Mathematics
- **Sathya Gopalakrishnan,** Associate Professor, Agricultural Environmental and Development Economics
- **Scott Lloyd DeWitt,** Associate Professor, English
- **Shoshanah Goldberg-Miller,** Assistant Professor, Art Administration, Education and Policy
- **Skyler Cranmer,** Associate Professor, Political Science
- **Sonia Manjon,** Associate Professor, The Barnett Center for Integrated Arts and Enterprise, Arts Administration, Education and Policy, Latina/o Studies
- **Steffen Lindert,** Assistant Professor, Chemistry and Biochemistry
- **Stephan Frank,** Post-Doctoral Researcher and Lecturer, Astronomy
- **Stephanie Liu,** Assistant Professor, Human Science
- **Steven Bibyk,** Manager, Distance Learning and Technology Center for Languages, Literatures and Cultures
- **Sujan Manandhar,** Manager, Distance Learning and Technology and Center for Languages Literatures and Cultures
- **Susan Gershman,** Assistant Professor, Evolution, Ecology and Organismal Biology
- **Susan Melsop,** Associate Professor, Department of Design
- **Tasos Sidiropoulos,** Assistant Professor, Computer Science Engineering and Mathematics
- **Theodore Chao,** Assistant Professor, Mathematics Education
- **Thomas Davis,** Associate Professor, English
- **Tijs van Maasakkers,** Assistant Professor, City and Regional Planning
- **Tim Linden,** Post-Doctoral Fellow, Physics CCAPP
- **Tracie McCambridge,** Educator for Teacher and Docent Programs, Wexner Center for the Arts
- **Wei Xu,** Assistant Professor, Computer Science and Engineering

- **Yune Lee,** Assistant Professor, Speech & Hearing Science
- **Yvette Shen,** Assistant Professor, Design
- **Zakee Sabree,** Assistant Professor, Evolution, Ecology and Organismal Biology
- **Zoë Plakias**, Assistant Professor, Agricultural, Environmental, and Development Economics

STEAM ALUMNI MEMBERS

- **Aurelie Vialette**, Assistant Professor, Spanish Portuguese
- **Behrooz Omidvar-Tehrani,** Postdoctoral Researcher, Computer Science Engineering
- **Ben Caplan,** Professor, Philosophy
- **Cheng Zhang**, Post-Doctoral Student, AACAD
- **David Goss,** Academy Professor, Mathematics
- **David McKenzie**, Graduate Student, Graphic Design
- **Derrick Tillman-Kelly,** University Innovation Alliance Fellow, Office of Academic Affairs
- **Elsa Donovan**, Assistant Professor, Pediatrics
- **Emma Oti,** Graduate Student, Earth Sciences
- **Gaj Sivandran**, Assistant Professor, Civil Engineering and Geodetic Engineering
- **Galyna Korniyenko,** Graduate Student, Engineering
- **Hugh Morris,** Post-Doctoral Researcher, Biomedical Engineering, College of Optometry
- **John Pippen,** Associated Faculty, Agricultural Technical Institute
- **Jonathan Capps,** Graduate Student, Art
- **Johanna Devaney,** Assistant Professor, Music
- **Kate Harkin,** Director, P-12 Initiative
- **Luis Rademacher,** Assistant Professor, Computer Science Engineering
- **Mary Faure,** Director, Engineering Technical Communications
- **Matthew Adair,** Program Coordinator, Center for Urban & Regional Analysis
- **Mike Mandel,** Research Scientist, Computer Science Engineering
- **Noelle Beckman,** Post-Doctoral Researcher, Mathematical Biosciences Institute
- **Rebecca Ricciardo,** Lab Supervisor, Chemistry and Biochemistry
- **Sam Handelman,** Research Assistant Professor, Molecular Virology, Immunology & Medical Genetics
- **Stephen Takas,** Lecturer, Art
- **Tanya Saunders,** Assistant Professor, African-American & African Studies
- **Terrell Strayhorn,** Director, Center for higher Education Enterprise

STEAM FACTORY AT-A-GLANCE

- Grew over 600% since June 2014, from 24 members to over 150 members (August 2017) spanning hundreds of disciplines
- Organized 180+ outreach events reaching 15,000+ people in the past four years
- Since 2014, the STEAM Factory has had 8 members awarded NSF Early CAREER Awards with STEAM letters of support for broader impact of research activities
- STEAM Factory's strength is in its diversity:
    - Funding - supported by seven colleges and offices within Ohio State
    - Academic – hundreds of disciplines represented by STEAM membership including more than 80 departments and 38 colleges, offices and institutes within the university
    - Underrepresented Groups – 50% women represented by STEAM membership and 21.3% underrepresented racial/ethnic groups
- Since 2013, the STEAM Factory has hosted over 35 Franklinton Friday and Farmers Market faculty presentations with an average audience of more than 200 people, and over thousands of people in attendance total. These outreach activities have included 70+ Ohio State faculty representing 35+ academic disciplines
- Over 130 undergraduate and graduate students have presented at STEAM outreach activities
- Since 2014, the STEAM Factory has hosted 29 STEAM Exchanges (salon-style colloquia) with an average of 30 attendees at each STEAM Exchange. The 70 faculty STEAM Exchange presenters have represented 48 disciplines and attendees have represented over 70 disciplines
- Since their development in January 2016, STEAM Powered Project (SPP) seed grants have:
    - Awarded a total of $81,693 in funding
    - To 13 collaborative interdisciplinary projects in research, teaching and outreach
    - SPP funding has supported 29 STEAM Factory faculty members' projects (and 3 non-STEAM faculty members),
    - SPP faculty have represented 22 different disciplines

STEAM FACTORY GROWTH

Since June of 2014, The STEAM Factory has grown to over 150 active members and nearly 30 alumni and widening the breadth of disciplines to hundreds across more than 80 departments, spanning 38 Colleges, Centers and institutes within Ohio State.

The STEAM Factory takes on the dual challenges of enhancing collaboration across all of the university's research disciplines and engaging the community through provision of unique, transformational opportunities for Ohio State researchers. Members are able to share innovative research projects directly with a public audience that might otherwise be difficult to reach. The STEAM Factory also develops and mobilizes community and industry partnerships that bring real-world expertise and knowledge to Ohio State students.

The STEAM Factory is located among the artists and innovators at 400 West Rich, in the heart of Franklinton's urban renewal efforts and within close proximity to downtown Columbus, COSI and the Columbus Idea Foundry. This off-campus presence enhances community engagement defined by the Carnegie Foundation as: "the collaboration between institutions of higher education and their larger communities for the mutually beneficial exchange of knowledge and resources in a context of partnership and reciprocity."

The STEAM Factory has relied on a variety of program activities to spark faculty conversations and innovative methods and venues for research dissemination. The STEAM Factory continues to seek opportunities that will support its mission and help expand the range and impact of its interdisciplinary programming.

STEAM FACTORY MEMBER SUCCESSES

STEAM Factory members are recognized nationally and internationally for their accomplishments in their fields. The recognized members from 2013 – 2017 include:

- **Paul Sutter, Cosmological Research and Community Outreach Coordinator, CCAPP and Chief Scientist at COSI -** Best Director - Song of the Stars, Escape Velocity Film Festival, September 2017
- **Zoë Plakias**, **Assistant Professor, Agricultural, Environmental, and Development Economics** - Richardson Applebaum Award for Best Ph.D. Dissertation from the Food Distribution Research Society, October, 2017
- **Jesse Fox, Associate Professor, Communication -** NSF AISL, September 2017
- **Asimina Kiourti, Assistant Professor, Electrical and Computer Engineering -** NSF award on wireless brain implants, August 2017
- **Ryan Harne, Assistant Professor, Mechanical and Aerospace Engineering** - AFRL Summer Faculty Fellow, May 2017
- **Ryan Harne, Assistant Professor, Mechanical and Aerospace Engineering** - ASME Haythornthwaite Foundation Early Career Faculty Award, November 2016,
- **Ryan Harne, Assistant Professor, Mechanical and Aerospace Engineering -** ASME and ASA Best Paper Awards, 2017,
- **Ryan Harne, Assistant Professor, Mechanical and Aerospace Engineering -** National Science Foundation, September 2017
- **Sandra Enimil, Program Director, University Libraries, Copyright Resources Center -** OSU Diversity and Inclusion Award
- **Jennifer Schlueter, Associate Professor, Department of Theatre -** Ronald and Deborah Ratner Distinguished Teaching Award, 2017
- **Anna Dobritsa, Assistant Professor, Molecular Genetics -** Faculty recognition award from Sphinx Senior Class Honorary Society and Mortar Board Senior Honor Society, August, 2015
- **Jeff Agnoli, Assistant Professor, Office of Research** - Distinguished Staff Award, April, 2017
- **Jason Coronel, Assistant Professor, Communication -** Top Paper Award at the Biology and Communication Science Division at the International Communication Association, May 2017
- **Elizabeth Kirby, Assistant Professor, Psychology** - NARSAD Young Investigator Award, January 2018
- **Kathryn Campbell-Kibler, Associate Professor, Linguistics** - Ratner Teaching Award, November 2016
- **Kathryn Campbell-Kibler, Associate Professor, Linguistics** - NSF grant November 2016
- **Kathryn Campbell-Kibler, Associate Professor, Linguistics** - Botoman Teaching Award, December 2015

- **Marcello Canova, Associate Professor, Mechanical and Aerospace Engineering, Associate Director for Graduate and Continuing Education, Center for Automotive Research** - The National Science Foundation Career Award, January 2016
- **Marcello Canova, Associate Professor, Mechanical and Aerospace Engineering, Associate Director for Graduate and Continuing Education, Center for Automotive Research** - OSU College of Engineering Lumley Research Award, May 2016
- **Marcello Canova, Associate Professor, Mechanical and Aerospace Engineering, Associate Director for Graduate and Continuing Education, Center for Automotive Research** - SAE Ralph E. Teetor Education Award, Society of Automotive Engineers, April 2016
- **Marcello Canova, Associate Professor, Mechanical and Aerospace Engineering, Associate Director for Graduate and Continuing Education, Center for Automotive Research** - Michael J. Moran Award for Excellence in Teaching, The Ohio State University, May 2017
- **John Beacom, Professor, Physics, Astronomy, CCAPP –** NSF New Frontiers in Nuclear Astrophysics, July 2017
- **John Beacom, Professor, Physics, Astronomy, CCAPP -** OSU Arts and Sciences Distinguished Professor, 2017
- **John Beacom, Professor, Physics, Astronomy, CCAPP** - Fermilab Distinguished Scholar, 2017-2018
- **Jonathan Song, Assistant Professor, Mechanical Aerospace Engineering -** American Cancer Society Institutional Research Grant, Ohio State University, February 2015
- **Jonathan Song, Assistant Professor, Mechanical Aerospace Engineering -** American Heart Association Scientist Development Grant, July 2015
- **Jonathan Song, Assistant Professor, Mechanical Aerospace Engineering** - Pelotonia Junior Investigator Award, July 2016
- **Karl Whittington, Associate Professor, History of Art** - Ronald and Deborah Ratner Distinguished Teaching Award, Division of Arts and Humanities, the Ohio State University, November 2016
- **Jeff Bielicki, Assistant Professor, Civil Engineering, Geodetic Engineering** - College of Engineering Lumley Research Award, 2017
- **Jeff Bielicki, Assistant Professor, Civil Engineering, Geodetic Engineering** - Best Geothermal Presentation of the Year 2013, 2014, 2015
- **Psaras McGrier, Assistant Professor, Chemistry and Biochemistry** - 2017 Journal of Materials Chemistry C Emerging Investigator
- **Maurice Stevens, Associate Professor, Comparative Studies** - Distinguished Diversity Enhancement, 2016
- **Harmony Bench, Assistant Professor, Dance** - Virginia Hull Research Award, April 2017
- **Nancy Santagata, Visiting Scholar, Chemistry** - Chemistry & Biochemistry Staff Recognition Award, January 2017
- **Giorgio Rizzoni, Professor, Mechanical and Aerospace Engineering, and Electrical and Computer Science Engineering -** 2017 FKFS Medal of Merit, Research Institute of Automotive Engineering and Vehicle Engines (FKFS)

- **Giorgio Rizzoni, Professor, Mechanical and Aerospace Engineering, and Electrical and Computer Science Engineering -** 2017 Clara M. and Peter L. Scott Faculty Award for Excellence in Engineering Education, College of Engineering, The Ohio State University
- **Kim Landsbergen, Visiting Research Scholar, Evolution, Ecology and Organismal Biology -** SOCHE Faculty Excellence Award for Teaching for the 2017-18 academic year
- **Arnab Nandi, Assistant Professor, Computer Science Engineering** - Best Paper Honorable Mention Award, IUI 2017
- **Wei Xu, Assistant Professor, Computer Science and Engineering -** Young Researcher of the 2017 Heidelberg Laureate Forum
- **Chris Orban, Assistant Professor, Physics -** PI of a Connect & Collaborate grant from the OSU office of outreach, April 2017
- **Chris Orban, Assistant Professor, Physics -** American Institute of Physics (AIP) Meggers Award, July 2017
- **Thomas Davis, Associate Professor, English** - Donald and Deborah Ratner Teaching Award, 2016
- **Thomas Davis, Associate Professor, English** - Short-Listed for Modernist Studies Association Book of the Year Award
- **David Penneys, Associate Professor, Department of Mathematics -** NSF CAREER award, September 2017
- **Shoshanah Goldberg-Miller, Assistant Professor, Art Administration, Education and Policy** - Team teaching grant College of Arts and Sciences, Spring 2017
- **Zakee L. Sabree**, **Assistant Professor, EEOB** - NSF IOS Award, 2017
- **Sanjeevi Krishnan, Assistant Professor, Department of Mathematics -** Air Force Office of Science Research Award, 2016
- **Matt Kahle, Assistant Professor**, **Department of Mathematics -** NSF RTG Award 2016
- **Jason Cervenec, Education and Outreach Director, Byrd Polar Research Center** - NSF AISL Award, 2016
- **Tijs Van Maasakkers, Assistant Professor, Department of City and Regional Planning** - Lumley Research Award, Ohio State College of Engineering, 2016
- **Anne Co, Assistant Professor, Department of Chemistry & Biochemistry** - Lumley Research Award, Ohio State College of Engineering, 2016
- **Arnab Nandi, Assistant Professor, Department of Computer Science Engineering** - Lumley Research Award, Ohio State College of Engineering, 2016
- **Arnab Nandi, Assistant Professor, Department of Computer Science -** IEEE TCDE Award, 2016
- **Harmony Bench, Assistant Professor, Department of Dance** - Battelle Engineering, Technology, and Human Affairs, 2016

- **Chris Orban, Assistant Professor, Department of Physics** - Battelle Engineering, Technology, and Human Affairs, 2016
- **Chuan Xue, Assistant Professor, Department of Mathematics** - NSF CAREER, 2016
- **Robert Pyatt, Assistant Professor, Department of Pathology** - Friend of Education, Hilliard Education Association, 2016
- **Maurice Stevens, Associate Professor, Department of Comparative Studies** - Ronald and Deborah Ratner Distinguished Teaching Award, 2016
- **Robert Pyatt, Assistant Professor, Department of Pathology** - O-H-I-Omics Genetic Counseling Teaching Award, 2016
- **Kareem Usher, Assistant Professor, Department of City and Regional Planning** - Ohio State Discovery Theme InFACT SEED Grant, 2016
- **Kathy Malone, Assistant Professor, Department of Science Education** and **Zakee Sabree, Assistant Professor, Evolution, Ecology, and Organismal Biology -** Mathematics and Science Partnership Grant, 2015
- **Theodore Chao, Assistant Professor, Department of Mathematics Education** - Ohio State EHE SEED Grant, 2016
- **Harvey Miller, Professor, Geographic Information Science** - University Consortium for Geographic Information Science (UCGIS) Research Award, 2015
- **Arnab Nandi, Assistant Professor, Department of Computer Science Engineering** - NSF Early CAREER, 2015
- **Lisa Hall, Assistant Professor, Department of Chemical & Biomolecular Engineering** - NSF Early CAREER, 2015
- **Tasos Sidiropoulos, Assistant Professor, Computer Science Engineering & Mathematics** - NSF Early CAREER, 2015
- **Arnulfo Perez, Assistant Professor, Department of Mathematics, Chris Stewart, and Kathy Malone**, **Assistant Professor, Department of Science Education -** NSF STEM+C 2015
- **Anne Co, Assistant Professor, Departments of Chemistry & Biochemistry** - NSF CAREER, 2015
- **Luis Rademacher, Assistant Professor, Computer Science Engineering** - NSF Early CAREER, 2014
- **Matt Kahle, Assistant Professor**, **Department of Mathematics** - NSF Early CAREER, 2014
- **Cheng Zhang, Assistant Professor, AACAD** - Science Visualization Fellowship with NASA, 2014
- **Manoj Srinivasan, Associate Professor, Department of Mechanical Aerospace Engineering** - NSF Early CAREER, 2013

CHAPTER 2:

STEAM FACTORY INITIATIVES AND SERVICES

FACILITATING COLLABORATION

STEAM COLLABORATION AND COWORKING SPACE AT 400 WEST RICH

The STEAM Factory discovered its future home on the second floor of the 400 West Rich studios in the Franklinton neighborhood of Columbus early in 2013. The building was originally a factory, but the owner had been leasing studio spaces out to small businesses and artists as it quickly became a hub of the arts and innovation in the quickly revitalizing East Franklinton neighborhood. The building is in close proximity to other urban renewal efforts, COSI, and the Columbus Idea Foundry, just across the Scioto River from downtown. STEAM felt that this location and its surroundings perfectly complimented the diversity within the organization.

The STEAM Factory hosted many design collaboration meetings to determine how the membership envisioned using its new space, what artifacts were needed to encourage collaboration and what types of programming would support this collaboration. The goal was to create a flexible and agile space that supported a coworking environment and enabled STEAM to host many special events benefitting its membership, the Ohio State community and members of the general public. The STEAM Space at 400 W. Rich was furnished and fully functional by December 2015, with the formal opening celebration in January 2016.

STEAM SPACE AT-A-GLANCE:

- STEAM has hosted 180+ events including roundtables, workshops, classes, faculty and student research showcases and outreach events spanning widely diverse disciplines with over 15,000 attendees
- STEAM has sponsored over 120 events with $35,000 in space sponsorships
- 3,600+ total attendees at STEAM space sponsored events
- This 3,700 square foot space offers:
  - A bright and welcoming work environment
  - Multi-functional co-working space
  - Conference room space
  - Smaller rooms for private space
  - Kitchenette facility
  - Bathrooms and onsite shower
  - 75" smart TV, Wi-Fi network, Wi-Fi speakers, charging station, projector and screen

THE STEAM SPACE - FACILITIES THAT SUPPORT COLLABORATION AND DISSEMINATION

The STEAM space is intentionally and specifically designed to support its core mission of facilitating collaboration and dissemination. Collaboration is encouraged through formal and informal activities held in the multi-functional space that enable members to share skills, resources, and opportunities. The space is intentionally designed to be easily reconfigurable. Throughout the space, all of the tables and chairs, blackboards, whiteboards, technology and audio-visual equipment can be moved to serve a variety of functions and designs. There are designated "comfy" corners furnished with couches and pillows for those who need to take a break and relax. The space also includes a conference room equipped with three chalkboards and an 18-person conference table.

The STEAM space also helps bridge the gap between the STEAM Factory's initiatives and the Columbus community. Since its existence, STEAM has formed community partnerships with organizations such as the Columbus Idea Foundry, the Franklinton Development Association, the Franklin Park Conservatory, and a variety of other groups. These connections give factory members an opportunity to network and collaborate with a community of artists and innovators, as well as community and industry partners who otherwise would be difficult to reach. The 400 West Rich location also provides an informal environment that might be more accessible than the Ohio State campus for engaging with a broader public audience.

The facilities at 400 West Rich provide The STEAM Factory with an unparalleled opportunity to conduct outreach and directly engage with the Columbus community. Dozens of members of The STEAM Factory have already participated in the Franklinton Friday Open House and previously hosted bi-weekly Farmers Markets, engaging members of the public and sharing their knowledge using creative, interactive displays.

The development of programming for STEAM faculty as well as university and community partners' use of the STEAM space at 400 West Rich has been significant. Programming has included a wide and evolving variety of seminars, workshops, visiting departmental scholars and speakers and workshops. The STEAM Factory will continue to expand its current mission-driven programming. Funding will be used for the ongoing support of a wide variety of STEAM Factory hosted seminars, workshops, public lectures, colloquia, roundtable discussions, film premiers, symposia and research showcases. These events aid in the scholarship of The STEAM Factory members and also encourage interdisciplinary discussion and collaboration between STEAM members and the greater community.

To further facilitate a culture of creativity and collaboration, the STEAM Factory venue at 400 West Rich provides a neutral creative space for brainstorming research ideas and potential research innovations. It is a place to conduct collaborative research, mentor students, and host engaging interdisciplinary workshops, colloquia and public lectures. It also allows researchers to showcase current work to the greater, non-university public that might otherwise be difficult to reach. These STEAM Factory programs and initiatives utilize multiple spaces within 400 West Rich, Franklinton and other key areas in Columbus to host workshops, public lectures, seminars and Franklinton Friday exhibitions. Ultimately, The STEAM Factory serves as an unprecedented, widely accessible engagement center for Ohio State University.

As part of Ohio State's broader goal of removing barriers to education, The STEAM Factory fosters an environment that allows its faculty members to educate both inside and outside of the classroom. Programming initiatives and activities facilitate learning and engagement across the Ohio State community, contributing to the university's goal to increase collaborative, interdisciplinary research and enhance the scholarship of Ohio State's world class researchers. This includes beneficial, transformative interactions between different members of The STEAM Factory across academic disciplines. It also includes exchanges between STEAM Factory members, Ohio State students, and non-academic audiences, such as the diverse community of artisans, entrepreneurs, innovators and incubator companies located at 400 West Rich. The STEAM Factory additionally has the valuable opportunity to engage with visitors to 400 West Rich through its Franklinton Friday Open Houses, specialized events and destination events such as Independents Day and Urban Scrawl.

By locating outreach activities both on campus and within the Franklinton area of Columbus, The STEAM Factory contributes to the city's revitalization of a neighborhood that has been economically depressed for several decades. Much national press has been given to the dramatic revitalization efforts currently underway in Franklinton, including the following series for The Atlantic by John Tierney: **Remaking Columbus' Most Downtrodden Neighborhood**: http://theatln.tc/YU1PSm; **How to Attract Artists to a Down-and-Out Neighborhood:** http://theatln.tc/16cpjpV; and, **Gentrification 'Without the Negative' in Columbus, Ohio:** http://theatln.tc/1xEuJls

STEAM EXCHANGES

Facilitating Collaboration: STEAM Exchanges

STEAM Exchanges are monthly themed interdisciplinary seminars that provide multiple faculty perspectives to foster opportunities for cross-collaboration between members. This program is intended to facilitate both knowledge and interactions related to current and ongoing faculty research here at Ohio State. STEAM Exchanges are intended to be small (less than 40 people) and informal to allow for increased interaction and lively discussion between STEAM members and their invited colleagues and guests.

STEAM EXCHANGES AT-A-GLANCE:

- 29 STEAM Exchanges
- 70 faculty presenters
- 48 disciplines represented by STEAM Exchange presenters
- 70+ disciplines represented by attendees
- STEAM Exchange survey responses:
  - 98% talked with people outside their disciplines
  - 99% said they learned something new
  - 86% agree that interactions with people outside of your discipline is important
  - 77% interested in presenting at future STEAM Exchanges
  - 92% likely to recommend STEAM Exchanges to others

Activities that occur at STEAM Exchanges include but are not limited to:

- Discussions of current research endeavors, bringing multiple disciplinary perspectives to bear on a single issue with a purpose of identifying opportunities for cross-collaboration.
- Specialty programming that facilitates interdisciplinary faculty collaborations, e.g. “Faculty Research Speed Seminars” and “Describe your Research in 60 Seconds.”
- Shared experiences and the transfer of tools and resources to enhance teaching methods, e.g. research commercialization, digital publishing and course creation, incorporation of technology into the classroom, and utilization of remote lectures.

"[Our] collaboration would not have been possible without STEAMx. I met Zakee [Sabree] at one of the STEAMx initial meetings and we began discussing ways that we could collaborate in the future. Our collaboration has led to the MSP grant; working with local biology teachers and engineering educators to produce a modeling based high school biology curriculum aligned with bioengineering projects. On another front my department wants to produce a new integrated science course for elementary science preservice teachers. However, it initially hit a roadblock because they did not have any biology professors interested. After I met Zakee and approached he was ready to start discussing it. I am sure our collaboration will continue for many years as through the work with the biology curriculum we have started to discuss the design of a blended MA in Biology education specializing in Evolution, Ecology and Organismal Biology that would be granted through Zakee's department."

STEAM EXCHANGE TOPICS 2013 TO PRESENT

- **April 20, 2017. Topic: Weeds**
  Presenters: **Bruce Ackley**, (Extension Program Specialist Weed Science, Department of Horticulture and Crop Science), **Derick Lindquist**, (Assistant Professor, Behavioral Neuroscience, Center for Brain Injury), **David Penneys**, (Assistant Professor, Department of Mathematics)

- **March 23, 2017. Topic: Taking Stock**
  Presenters: **Timothy Newfield**, (Assistant Professor, History & Biology, University of Georgetown), **Laura Pomoeroy** and **Rebecca Garabed**, (Research Associate, and Associate Professor, Disease Ecology and Computer Modeling Lab, Department of Veterinary Preventive Medicine)

- **February 16, 2017. Topic: Evidence**
  Presenters: **Ric Simmons**, (Professor, Moritz College of Law), **Mark Rudoff**, (Associate Professor, School of Music), **Kerry Dhakal**, (Assistant Professor, Research and Education Librarian, University Libraries)

- **January 19, 2017. Topic: Nasty Surprises**
  Presenters: **Enrico Bonello**, (Professor, Department of Plant Pathology), **Julien Nicolas**, (Graduate Student, Research Assistant, Byrd Polar & Climate Research Center), **Michael Rayo**, (Assistant Professor, Department of Integrated Systems Engineering)

- **December 1, 2016. Topic: Speed Seminars: My Research in 60 Seconds** (If you had only 1 minute and 1 slide to explain the core essentials of your academic research, what would you say?)

The STEAM Exchange uses an innovative approach that allows faculty researchers to share and discuss their current work. Over 45 faculty members participated in this event which has become the yearly favorite STEAM Exchange for many members.

- **November 3, 2016. Topic: Webs**
  Presenters: **Sarah Rose**, (PhD Candidate, School of Environmental and Natural Resources), **Tasos Sidiropoulos**, (Assistant Professor, Departments of Computer Science & Engineering and Mathematics), **Jessica Logan**, (Senior Research Scientist, Department of Education and Human Ecology), **Glennon Sweeney**, (Research Associate, Kirwan Institute for the Study of Race and Ethnicity, PhD Student, City and Regional Planning Department)

- **October 6, 2016. Topic: Food**
  Presenters: **Bartow Elmore**, (Assistant Professor, Department of History), **Leah Bevis**, Associate Professor, Department of Agricultural, Environmental and Development Economics), **Christopher Simons**, (Assistant Professor, Department of Food Science & Technology)

- **April 21, 2016. Topic: Trees**
  Presenters: **Ryan Harne,** (Assistant Professor, Mechanical and Aerospace Engineering), **Enrico Bonello**, (Professor, Department of Plant Pathology), **Laura Kubatko,** (Professor, Evolution, Ecology and Organismal Biology and Statistics)

- **March 31, 2016. Topic: Preservation**
  Presenters: **Emily Frieda Shaw**, (Assistant Professor, Head of Preservation & Reformatting, University Libraries), **Jon Low**, (Assistant Professor of Comparative Studies, American Indian Studies), **Joel Barker**, (Assistant Professor, School of Earth Sciences, Byrd Polar and Climate Research Center), **Hannah Kosstrin**, (Assistant Professor, Department of Dance, Melton Center for Jewish Studies)

- **February 25, 2016. Topic: Cheating**
  Presenters: **Shoshanah Goldberg-Miller**, (Assistant Professor, Departments of Arts Administration, Education, and Policy and City and Regional Planning), **Kathryn Corl**, (Associate Professor Emerita, Former Coordinator of the Ohio state university on academic misconduct), **Zakee Sabree**, (Assistant Professor, Department of Evolution, Ecology, and Organismal Biology)

- **January 21, 2016. Topic: Sustainable Cities**
  Presenters: **Harvey Miller**, (Professor, Reusche Chair, Geographic Information Science), **Tijs van Maasakkers,** (Assistant Professor, City and Regional Planning)

- **November 19, 2015. Topic: Reciprocity**
  Moderator: **David Sivakoff, (**Assistant Professor, Departments of Statistics and Mathematics)
  Presenters: **Zakee Sabree**, (Assistant Professor, Evolution, Ecology & Organismal Biology), **Ruchira Datta**, (Pelotonia Postdoctoral Fellow, The James Cancer Center), **Keith Warren**, (Associate Professor, College of Social Work)

- **October 22, 2015. Topic: Small Size, Big Impact**
  Presenters: **Ayaz Hyder**, (Assistant Professor, Environmental Health Sciences & Translational Data Analytics), **James Coe**, (Professor, Department of Chemistry), **Jesse Kwiek**, (Associate Professor, Depts. of Microbial Infection, Immunity, Microbiology & Centers of Microbial Interface Biology & Retrovirus Research)

- **September 24, 2015. Topic: Speed Seminars: My research in 60 seconds** (If you had only 1 minute and 1 slide to explain the core essentials of your academic research, what would you say?)

  This introductory STEAM Exchange uses an innovative approach that allows faculty researchers to share and discuss their current work. In September 2015, over 45 faculty members participated in this event which has become the yearly favorite STEAM Exchange for many members.
  This speed style event has become so popular that many faculty members and friends of the STEAM Factory now use this format in their own departments and organizations. Jim Fowler (Assistant Professor, Mathematics and Director of Public Outreach for The STEAM Factory) said that he used the Speed Seminars format for "lightning talks" at a conference that he organized at the Fields Institute. Similarly, Ayaz Hyder (Assistant Professor, Division of Environmental Health Sciences and Affiliated Faculty, Translational Data Analytics) offers, "The College of Public Health used the research in 60 second model from STEAM Factory during their Research Day earlier this year. The idea was a hit and everyone benefited from the quick yet informative presentation going on in other faculty members' research programs. We hope to do it again at the next Research Day event for the College."

- **May 7, 2015. Topic: The "A" in STEAM**
  Presenters: **Jessica Ann**, (MFA candidate, Department of Art), **Jonathan Capps**, (MFA candidate, Department of Art), **Megan Fitze**, (graduate student, Department of Arts Administration and Policy), **Gretchen McIntosh**, (PhD candidate, Department of Arts Administration and Policy)

- **March 26, 2015. Topic: Connections**
  Presenters: **David Sivakoff,** (Assistant Professor, Department of Statistics), **Skyler Cranmer, (**Associate Professor, Department of Political Science), **Tasos Sidiropoulos**, (Assistant Professor, Department of Mathematics and Computer Science Engineering)

- **February 19, 2015. Topic: Bias**
  Presenters: Lanier F. Holt, (Assistant Professor, College of Communications), Ghaith A. Hiary, (Assistant Professor, Department of Mathematics), Pamela Salsberry, (Professor, Health Behavior and Health Promotion, College of Public Health)

- **January 22, 2015. Topic: Progress**
  Presenters: **Jeff Bielicki** (Assistant Professor, Department of Civil, Environment and Geodetic Engineering and The John Glenn School of Public Affairs), **Christopher Otter**, Associate Professor, Department of History, **Richard Samuels** (Professor, Department of Philosophy and Center for Cognitive and Brain Science)

- **November 13, 2014. Topic: Movement**
  Presenters: **Noelle Beckman** (Postdoctoral Fellow, Mathematical Biosciences Institute), **Stephen Takacs** (Lecturer, Department of Art), **Christine Charyton** (Associate Professor of Neurology, The Ohio State University Medical Center)

- **October 6, 2014. Topic: Blood**
  Presenters: **Katie Walton** (Assistant Professor of Psychology and Psychiatry, Nisonger Center), **Randolph Roth** (Professor, Department of History and Sociology), **Sam Handelman** (Research Assistant Professor, Center for Pharmacogenomics)

- **September 10, 2014. Topic: Speed Seminar: My Research in 60 Seconds**
  Each attendee shared one slide and explained in 60 seconds the core essentials of their respective academic discipline or area of research expertise. The exercise was intended to introduce a diverse group of researchers to each other and their respective work to foster further discussion and potential collaborations.

- **April 23, 2014. Topic: Pop**
  Presenters: **Treva Lindsey** (Assistant Professor, Department of Women's Gender and Sexuality Studies), **Tanya Saunders** (Assistant Professor, Department of African-American and African Studies), **Charlie Wilmoth** (Department of Music, Otterbein University)

- **March 27, 2014. Topic: Workshop on Interdisciplinarity**
  This event adopted a different format than usual. First, a presentation was given by Stephen Myers (Associate Provost, Office of Academic Affairs) about Ohio State's Discovery Themes and opportunities within the recent Requests for Proposals. Attendees then divided into working groups along disciplinary lines to discuss the needs and required outcomes of research conducted in each field. Finally, attendees divided into groups based on interest in each of the current Discovery Theme topics to brainstorm potential collaborative research topics. Two collaborative research project titles were proposed in the areas of Emerging Disease and Materials for a Sustainable World.

- **February 26, 2014. Topic: Interdisciplinarity: Academics without borders**
  Presenters: **Micha Elsner** (Assistant Professor, Department of Linguistics), **Lise Worthen-Chaudhari** (Research Assistant Professor, Department of Physical Medicine and Rehabilitation), **Johanna Devaney** (Assistant Professor, School of Music)

- **January 23, 2014. Topic: Climate change**
  Presenters: **Lonnie Thompson** (Distinguished University Professor in the School of Earth Sciences and Byrd Polar Research Center), **Sam White** (Assistant Professor, Department of History), **Sathya Gopalakrishnan** (Assistant Professor, Department of Agricultural, Environmental, and Developmental Economics)

- **November 7, 2013. Topic: Speed Seminars**
  This event adopted a different format than the usual Speed Seminars. All attendees first gave a short presentation describing their field of research, as usual. Then the group was split into small working groups, each of which documented the required inputs and outcomes of individual research disciplines. This event was geared towards increasing awareness of potential impediments and opportunities with respect to interdisciplinary collaboration.

- **October 8, 2013. Topic: Conflict**
  Presenters: **Sandra Enimil** (Head of Copyright Resources Center, Office of Academic Affairs**), Susan Gershman** (Assistant Professor, Department of Evolution, Ecology and Organismal Biology), **Manoj Srinivasan** (Assistant Professor, Department of Mechanical Engineering)

- **May 29, 2013. Topic: My research, my life**
  Presenters: **James Chen** (Assistant Professor, School of Biomedical Science), **Matthew Kahle** (Department of Mathematics), **Michael Mandel** (Research Scientist, Department of Computer Science and Engineering)

- **April 9, 2013. Topic: Community**
  Presenters: **Meris Mandernach** (Head of Research Services, Ohio State Libraries), James Fowler (Lecturer, Department of Mathematics), **Aurelie Vialette** (Assistant Professor, Department of Spanish and Portuguese)

"After speaking at STEAM Exchange in October (about family relationships and autism), I had a conversation with Wolfgang Sadee, who attended the exchange. This led to additional meetings and a research collaboration—they are interested in looking at genetics of autism in large existing datasets (I mentioned several autism datasets during my talk that had not yet come to their attention), and I am interested in family relationships/adjustment and how shared genetic risks + stress may influence adjustment in parents and siblings of kids with autism. I have recently been added to their IRB and we just put in a formal data application for genetic data—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!"

--- Submitted by Dr. Katie Walton (Assistant Professor, Department of Psychology) 3/19/15

"What do you want to gain from the STEAM Exchanges?" – FROM STEAMX QUALTRICS SURVEYS

STEAM POWERED PROJECTS (SPP) SEED GRANTS

In January 2016, The STEAM Factory developed a new micro-grant program intended to provide seed funding for STEAM Factory members working on interdisciplinary projects or collaborations in research, teaching or outreach between one of more STEAM Factory member. The STEAM Factory has offered this seed funding program three times since its creation (January 2016, April 2016, May 2017).

The goal of the program is to provide a streamlined seed funding program for collaborations that further the STEAM Factory mission, benefit the STEAM Factory membership as a whole but may not be easily fundable through traditional funding sources. The application provides an abbreviated and peer-reviewed process. Matching external funding is strongly encouraged. Letters of support from department Chairs are also highly recommended. Maximum funding is $5,000 per STEAM Factory member contributing to the collaboration with a maximum total of $25,000 per project. Applications are reviewed by an interdisciplinary team of their STEAM Factory faculty peers. Project Principal Investigators are also required to submit mid-term and final project reports and budgets upon completion.

STEAM POWERED PROJECTS (SPP) AT-A-GLANCE:

- A total of $81,693 funds awarded,
- 13 collaborative interdisciplinary projects in research, teaching and outreach projects received funding,
- SPP funds were distributed to 29 STEAM Factory faculty members (and 3 non-STEAM faculty members),
- SPP faculty represent 22 disciplines

Below is a brief summary description of currently funded STEAM Powered Projects.

STEAM POWERED PROJECTS

BITS IN DIGS

Primary Investigator: **Alvaro Montenegro, PhD— Assistant Professor**, Department of Geography - College of Arts and Sciences

STEAM Collaborator: **Sam White, PhD— Assistant Professor,** College of Arts and Sciences – History

Goals

1. Acquaint history and archaeology researchers with state-of-the-art, data-heavy climate and human migration computer models.
2. Give modelers a better understanding of the needs faced by historical and archaeological research and how these can become better incorporated in model development and analysis.

Summary

Recent years have seen a significant increase in our ability to develop and use sophisticated computer models representing several natural and human systems. Climate models, for example, have become important tools to help us better understand and prepare for anthropogenic warming. To take an example related to human systems, transit managers and city planners routinely adopt traffic simulation models. While archaeologists and historians have a long tradition in relating the state of human groups to past environmental variability, this is usually done in the form of narratives, or else as simple correlations, where the actual impact of environmental change on human systems is assumed but not necessarily tested or quantified. Here is where we think quantitative computer models can make a difference. These can offer both a more holistic description of environmental change and the ability to generate quantitative estimates of how these natural changes affected humans and their societies. We want to contribute to these types of initiative by hosting a workshop that brings together historians, archaeologists, climatologists and modelers to discuss the use of computer models in the context of historical and archaeological research, with a focus on numerical climate and ocean voyaging modeling.

Total budget: $10,000 for traveling, lodging, meals and incidentals

Awarded by STEAM Factory: $10,000

E-TEXTILE ORIGAMI

Primary Investigator: **Asimina Kiourti, PhD— Assistant Professor,** Department of Electrical and Computer Engineering - College of Engineering

STEAM Collaborator: **Ryan L. Harne, PhD— Assistant Professor,** Department of Mechanical and Aerospace Engineering - College of Engineering

Summary

This collaborative STEAM Powered Project will establish the efficacy of a new cross-cutting technology -- bridging wave physics, art, and mechanics --that will yield e-textile functionalities to enable unique, transformative advancements in applications as diverse as patient mental health rehabilitation, biophysical monitoring, and engineering structure characterization. The new idea of this project is a foldable e-textile antenna, whose conductive surfaces follow the conformations 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. The deformations are then unobtrusively monitored via remote broadband antenna to leverage the data for applications, such as human computer interfaces or human performance tracking. In addition to the broad application impacts of these efforts, the unique integration of origami engineering and wave physics also provides an engaging means to introduce science and math fundamentals to young audiences.

Total Budget: $9213

Amount awarded by The STEAM Factory: $9213

HIV PECHA KUCHA

Primary Investigator: **Jesse J. Kwiek, PhD— Associate Professor,** Department of Microbiology - College of Arts and Sciences

STEAM Collaborator: **Thomas (Dodie) McDow, PhD— Assistant Professor, Department** of History - College of Arts and Sciences

Additional Collaborators: **Joel Diaz**, Chief Marketing & Community Affairs Officer, Equitas Health, **Audrey Regan**, Sexual Health Promotion, Director, Columbus Public Health

Summary

In 2015, we created a new multidisciplinary course (M3704) that traces the evolution of HIV at both the molecular level and within in its global historical context. The goal of M3704, at the broadest level, is to put the sciences and humanities in conversation as they consider the medical, scientific, social, political, and economic causes and consequences of one of the world's most successful viruses. As a culminating project for the Microbiology 3704 class, students worked in groups to create a Pecha Kucha presentation (20 slides that advance automatically every 20 seconds) that explored a transformative, controversial, or an under- appreciated aspect of the HIV epidemic and elucidated the moment. Leveraging funding from the STEAM factory and The Department of Microbiology, last April we hosted a Pecha Kucha night at the STEAM factory that showcased the best presentations from the course. The event was co-hosted by the STEAM Factory, AIDS Resource Center of Ohio (now Equitas Health), with the explicit desire to share research findings with the broader community; foster conversation between students, academics and stakeholders; and demonstrate the value of combining scientific and arts/humanities approaches to complex issues. We received overwhelmingly positive feedback from colleagues on the event, and although we did not collect written feedback (we will this year), we heard from many students that they really enjoyed the event and the interactions with the Ohio State faculty and community representatives. Many of the students (and even some of the faculty) had never been to the STEAM Factory before, and left with a great appreciation of the space and the reach of the university.

Because of an opportunity created during the STEAM FACTORY event last year, this year we will host Jeanne White-Ginder on campus. Jeanne White-Ginder is the mother of Ryan White, the young hemophiliac who contracted HIV/AIDS from a blood transfusion and died in 1990 at age 18. During his life he was both the victim of rampant discrimination and the face of people living with AIDS. He remains an important historical figure in the history of HIV/AIDS, and the federal program that supports anti-retroviral therapy and prevention efforts is named after him. His mother led the anti-discrimination fight in his lifetime (winning him the right to return to public school after his diagnosis and a long fight), and she has continued to be an outspoken advocate for people with AIDS and, more recently, against bullying.

Total Budget: $5650

Amount awarded by The STEAM Factory: $3000

Harnessing Ecosystem Services

Primary Investigator: **Frances S. Sivakoff, Postdoctoral Researcher**, Department of Entomology - College of Food, Agricultural and Environmental Sciences

STEAM Collaborators: **Mary M. Gardiner, Associate Professor,** Department of Entomology - College of Food, Agricultural and Environmental Sciences, **Daniela A. Miteva, Assistant Professor**, Department of Agricultural, Environmental, and Development Economics - College of Food, Agricultural and Environmental Sciences

Additional Collaborator: **Mary T. Rodriguez, Assistant Professor,** Department of Agricultural Communication, Education, and Leadership - College of Food, Agricultural and Environmental Sciences

Goals

1. This project aims to address the existing knowledge gaps by quantifying and monetizing the ecosystem services provided by urban vacant lots to communities along a socio- economic and habitat management gradient.
2. We will also disseminate our findings and collaborate with Cleveland city officials and local communities to promote cost-effective policy that sustains ecosystem service provision to urban households and hence improves the sustainability and resilience in the city.

Summary

One in six cities globally is a “shrinking city,” having undergone long-term economic and population decline due to geographic shifts in manufacturing, alterations in transportation routes, and suburbanization. The legacy of these changes is an overabundance of infrastructure, which is demolished over time resulting in large tracts of vacant land. While vacant lots impose a financial burden to cities, they likely generate significant ecosystem services like provisioning arthropods for pollination and pest control, cycling nutrients, filtering water and air, and sequestering carbon. Managing vacant lots for ecosystem services represents a long-term investment opportunity to improve the ecological value of these urban landscapes, but to have the buy-in of city officials and community members, these services must be measured and monetized. In the proposed project, we will measure ecosystem services in both vacant lots and in urban farms that rely on ecosystem services for sustainable food production. We will then monetize these services and disseminate our results to city officials and the surrounding communities. The results from this study can be used to promote policy to protect critical urban ecosystem structure and functions especially among low-income households who often face food insecurity and limited means of compensating for lost ecosystem services.

Total Budget: $69289

Amount awarded by The STEAM Factory: $15000

OHIO STATE FORC PROGRAM

Primary Investigator: **Zakee L. Sabree, PhD— Assistant Professor**, Department of Evolution, Ecology and Organismal Biology - College of Arts and Sciences

Summary

Underrepresented groups (URGs)-serving institutions are largely teaching-intensive and they often lack budgets to invite researchers from research-intensive institutions to give seminars and thus rely upon departmental faculty and those from nearby institutions to participate in their seminar series. As a result, students at SoC-serving institutions are primarily exposed to research and educational opportunities that are on campus or in these nearby institutions, and large institutions like Ohio State are easily overlooked when these students are considering higher education options. The Ohio State Faculty Outreach, Recruitment and Collaboration (FORC) Program seeks to provide an essential bridge between Ohio State STEM departments and their counterparts at higher education institutions largely serving populations of URGs by supporting highly research productive Ohio State STEM faculty to travel to these institutions to give science talks and interact with faculty and students in STEM departments at URG-serving institutions towards building a pipeline of URGs undergraduates into Ohio State STEM summer research and graduate degree programs and faculty-driven collaborations between Ohio State STEM departments and their counterparts at URG-serving institutions.

Total Budget: $8045.25

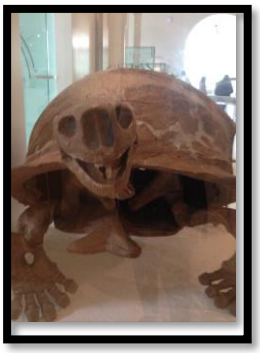
Amount Awarded from THE STEAM Factory: $4000

SPEAKING SCIENCE

STEAM Collaborators: **Katherine O'Brien, PhD— Contracted Teaching Assistant,** Center for Life Science Education - College of Arts and Sciences, **Laura Wagner, PhD— Associate Professor**, Department of Psychology - College of Arts and Sciences

Additional Collaborator: **Marymegan Daly, PhD— Associate Professor**, School of Earth Sciences - College of Arts and Sciences

Goals



1. Create a network of science educators in Ohio, Pittsburgh and Indiana.
2. Support a new service-learning course by creating a Science Share Idea Book for science communication and informal museum based activities.
3. Present these activities at the 2018 Museum of Biological Diversity open house.

Summary

The ability to communicate science in a fun and engaging way is a central mission of the STEAM factory. Speaking Science will use STEAM power to create a network of science museums across Ohio and its neighboring states to facilitate science communication to the public. Members of the STEAM factory will be traveling to local museums to create a multimedia Speaking Science: Idea book. This book is the foundational material for a new service-learning course, which will engage students at Ohio State by empowering them to design their own hands own science activities. These activities will be showcased at the Museum of Biological Diversity's 2018 open house, Franklinton Friday or COSI dependent on students activity focus.

Total Budget: $10500

Amount awarded by The STEAM Factory: $5280

INFORMATION, DIFFUSION DYNAMICS, AND PUBLIC CRISIS MANAGEMENT

Primary Investigator: **Skyler J. Cranmer, PhD,** College of Arts and Sciences— Political Science

STEAM Collaborators: **David Sivakoff, PhD— Assistant Professor,** College of Arts and Sciences— Statistics

Goals

1. Conduct a mobile lab-based experiment to understand how individuals consume, process, and share information related to a disease.
2. Understand how social networks influence the flow of information and how official communications from public health entities compete with socially transmitted beliefs.

Summary

This project will study participants' knowledge about Hepatitis C/Ebola/HIV: its symptoms, how it spreads, the health consequences of contracting it, and what can be done to stop its further spread. The experiment will be conducted in a mobile lab in such a way that participants will be placed in a social network during the experiment, asking them to communicate their beliefs to one another during the experiment. The project aims to test the hypothesis that beliefs about Hepatitis C/Ebola/HIV are socially influenced by the beliefs of others to whom the participant is connected through their social network.

Participants will be recruited from a variety of existing small groups, ranging from on-campus teams and clubs at Ohio State to community groups that may be at particularly high risk of contracting one of the diseases under study. Thus, team members will know each other in the real world and enter the study with real social networks. For a group entering the study, its members will be surveyed about (a) their personal characteristics and (b) their social network within the group to dramatically increase the level of realism involved.

Total Budget: $8,000

Awarded by STEAM Factory: $4,000 in April 2016

Intended Results:

- Will help public health organizations understand how much information is needed to stop spread of misinformation about diseases and foster the spread of accurate information.

Looking Ahead:

- Need to create a mobile computer laboratory: Google Chromebooks, oTree software

BIG HISTORY

Primary Investigator: **Sam White, PhD— Assistant Professor,** College of Arts and Sciences - History

STEAM Collaborators: **John Beacom, PhD— Professor,** College of Arts and Sciences— Physics, Astronomy, CCAPP, **Sathya Gopalakrishnan, PhD— Assistant Professor,** College of Food, Agriculture, and Environmental Sciences— Agricultural, Environmental, and Developmental Economics, **Jim Fowler, PhD— Assistant professor,** College of Arts and Science— Mathematics, **David Staley, PhD— Associate Professor,** College of Arts and Science— History.

Summary

Big History brings together the cosmic, earth, evolutionary, and human past. The course provides a consilient, non-technical introduction to the essential state of knowledge about the galaxy, planet, life, and humanity. The unifying theme throughout the course is emergence of increasingly complex and fragile systems in a universe forever moving toward entropy. By the end of the course, students acquire a basic grounding in some of the major theories that help explain our place in the cosmos, and a new appreciation of where we came from and where we might be going.

White has introduced Big History at Ohio State with the long-term goal of creating an online GE course that could be offered to both undergraduates and high school students through dual-enrollment or College Credit Plus programs. Given the broad scope of the course and the high-quality materials already produced for high school instruction, it is particularly suited for this purpose. In fall 2015, Dr. Sam White taught Big History (Hist 2720) as twice-weekly lecture course with a once-weekly interactive recitation section. The course involved the participation of five STEAM Factory members to contribute guest lectures in different disciplines.

Awarded by STEAM Factory: $1000

Notable Achievements:

- Received positive course evaluations
- Involved 5 STEAM Factory members as guest lecturers

Looking Ahead:

- Need $1000 for graduate student and transcription support
- Continue to generate content for online course in Spring 2018
- Compile new audio and visual material

SONG OF THE STARS

Primary Investigator: **Paul Sutter, PhD— Visiting Fellow,** College of Arts and Sciences — Physics, Astronomy

STEAM Collaborators: **John Beacom, PhD—Professor,** College of Arts and Science — Physics, Astronomy, **Leonardo Carrizo, PhD—Lecturer,** College of Arts and Science — Communications, **Mary Tarantino, PhD—Professor,** College of Arts and Science — Theater

Summary

Song of the Stars is 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. *Song of the Stars* will draw audiences into the life story of a star, including its turbulent birth in the early universe, the nurturing of a family of planets, and the loss of a companion. Led by **Seven Dance Company**, a Columbus non-profit dedicated to connecting communities through dance, the one-hour live premiere was held on April 21st at the Capitol Theater.

The live performance will be filmed, edited, and formatted by **Over the Sun** Productions for national distribution. The film will be supplemented by additional educational materials, such as a program book linking specific portions of the choreography to the astrophysics, and classroom guides for both dance and science education. Following the live premiere, individual pieces will be recorded by **COSI** staff with 360-degree cameras, creating a unique immersive experience for distribution to thousands of planetariums worldwide and for use in cutting-edge virtual reality headsets**.**

Total Budget: $125,000

Amount awarded by the STEAM Factory: $5,000

Notable Achievements:

- Attracted 400 audience members
- Kickstarter campaign raised $25,000
- Films will be distributed nationally on TV, online, and planetariums
- Film premiere at Gateway Film Center, January 2017
- Planetarium film premiere at COSI, June 1st, 2017
- Nationwide premiere on PBS member stations, June 21st, 2017
- International and educational market distribution scheduled for fall 2017

Looking Ahead:

- Train a traveling dance troupe and put SOTS on the road
- Pay the local dancers to perform it at more schools in the state and region
- Develop next year's theme with dancers paid from the start
- Incorporate more cutting-edge technology in next year's performance, like paintable circuits, drones, and video

RADIO UNIVERSE

CONNECTING BIOLOGY, PHYSICS, AND COSMOLOGY

STEAM Collaborators: **Paul Sutter, PhD— Visiting Fellow, (**College of Arts and Sciences — Physics, Astronomy, CCAPP), **Rob Pyatt, PhD—Assistant Professor—Clinical, (**College of Medicine — Department of Pathology)

Goals

1. Explore the science of radio astronomy & how humans generate radio waves
2. Create a 3-5 minute documentary exploring the connections between human biology and cosmic phenomena via radio waves

Summary

The Radio Universe will explore a connection between human and cosmic waves through a 3-5 minute film, showcasing the stunning Very Large Array radio telescope in New Mexico, and featuring interviews with Paul Sutter and Rob Pyatt to explain the science behind human- and cosmic-sourced radio waves. We will acquire and edit *The Radio Universe* in high-resolution 4K, granting output to a variety of formats, from planetarium full-dome to large format flat screens and the web. The film will blend traditional documentary into a full-dome production with engaging narrations, animations that augment human explanation, and breathtaking cinematography.

A standalone exhibit and demo station will complement the short film and strengthen the biology-cosmology connection. The exhibit will promote the development of a personal connection to cosmology as portrayed in the film through exploration of their similarities to this universal phenomenon. Employing simple electronics and repurposing a household satellite receiver, the exhibit will detect the radio emission from the human nervous system and respond with audio and visual cues. Guests will interact with the exhibit and learn how the receiver works and how the human body generates radio emissions.

Total Budget: $7,000 for materials, travel, video editing, licenses

Amount awarded by the STEAM Factory: $4000 in April 2016

Looking Ahead:

- Create an interactive exhibit in conjunction with a short documentary
- COSI and Ohio State will showcase the documentary in their planetariums

Notable Achievements:

- A 3-minute documentary exploring the connections between human biology and cosmic phenomena via radio waves currently playing at COSI and Arizona Science Center, and is being prepared for distribution to other planetariums
- Demo station is constructed and undergoing testing
- The film has been licensed so that it can be freely distributed and shown in a variety of formats, including planetarium domes, traditional screens, and online.

BUCKEYE VIRTUAL REALITY

Primary Investigators: **Chris Orban, PhD—Assistant Professor**, College of Arts and Sciences - Physics

STEAM Collaborators: **Jon Brown, PhD—Research Scientist, Lecturer,** College of Engineering — Chemical & Biomedical, **Jim Fowler, PhD—Assistant Professor,** College of Arts and Science — Mathematics, **Bart Snapp, PhD—Auxiliary Assistant Professor,** College of Arts and Science — Mathematics

Goals

Develop virtual reality visualizations of STEM concepts to be experienced with Google Cardboard glasses. This should help bridge the gap between the instructor's mental picture and the student's.

Summary

Like few other disciplines, physics and mathematics have a reputation among students for being particularly impenetrable.

In 2014, Google revealed and disseminated the plans for “Google Cardboard,” which allows the viewer to see 3D visualizations with stereoscopic depth perception, similar to a 3D movie at a movie theater, for about $5. There is a huge potential for this device to revolutionize STEM education if VR content can be developed and classroom tested on this platform.

During fall 2015 and spring 2016, Prof. Chris Orban worked with Ohio State Marion’s Chris Porter to develop smartphone-based VR visualizations for undergraduate electromagnetism classes. Dr. Jon Brown was also involved at an early stage allowing a collaboration which produced a demo for Android phones that illustrates electric fields from different distributions of charge. This demo of “BuckeyeVR” has been shown to the public at STEAM factory events. The immersive nature of the VR experience creates a kind of encounter with the mathematical reality of nature that no chalkboard or computer screen can truly replicate.

Notable Achievements:

- Implementation of BuckeyeVR into Ohio State physics classes, on both Android and iOS platforms
- Dr. Chris Porter organized a 600+ student study of VR in Physics 1251 on the Columbus campus. The team analyzed an important subset of the data and wrote up a paper describing the results. The paper is currently under review. https://arxiv.org/abs/1707.01544
- Graduate student Joe Smith worked with ASC Tech to set up the website https://buckeyevr.osu.edu/ which provides browser-based visualizations and convenient links to the Android and iOS apps.
- An invention disclosure was submitted to the Technology Commercialization Office in August 2017 that describes the 3D plotting app for math
- With the release of the app on Android and iOS it can be deployed more extensively in Physics 1251 as a regular part of instruction.

Looking Ahead:

- Expanding application of this technology into visualization of biological molecules
- Foster interdisciplinary relationship

HIV PECHA KUCHA

FROM MICROBIOLOGY TO MACRO HISTORY

Primary Investigators: **Jesse J. Kwiek**, (*Associate Professor*, Ohio State Departments of Microbial Infection & Immunity and Microbiology, project lead)

Project Collaborators: **Thomas (Dodie) McDow,** (*Assistant Professor, Ohio State* Department of History), **Zach Reau**, (*Community Engagement Manager,* AIDS Resource Center Ohio, Inc.)

Goals:

1. Share research findings with the broader community
2. Foster conversation between students, academics and stakeholders
3. Demonstrate the value of combining scientific and humanities approaches to complex issues

Summary:

The HIV Pecha Kucha project showcased the best collaborative, interdisciplinary work on HIV/AIDS based on an advanced undergraduate course taught be Doctors Kwiek, a virologist, and McDow, a historian. History/ Microbiology 3704, HIV: From Microbiology to Macrohistory was a team-taught class with a goal to put the sciences and humanities in conversation about the HIV virus and the estimated 35.3 million people around the world who are living with it. As a culminating project, students created a Pecha Kucha presentation that explored a transformative, controversial, or an unknown/under-appreciated aspect of the history of HIV that elucidated the moment. The presenters considered their specific HIV topic from a multidisciplinary perspective, drawing from the sciences and humanities. The Pecha Kucha format — 20 slides that advance automatically every 20 seconds — required succinct narratives (6:40 total!) complemented by strong visuals.

The STEAM Factory HIV Pecha Kucha event, held on April 19th, 2016, included six outstanding Pecha Kucha presentations from a class of eighty students and presentations from HIV community groups. This event was a celebration of the student's scholarship and provided a chance for a wider conversation. The STEAM Factory venue was ideal for hosting a diverse group in a congenial setting. The event was open to Ohio State affiliates, and we will specifically invited History/Microbiology 3704 students, STEAM factory members, members of the Columbus HIV affected/infected community and select members of the Ohio

State administration. To promote community involvement, we partnered with Mr. Zach Reau, Community Engagement Manager at AIDS Resource Center Ohio, Inc. (ARC), which is Ohio's premier community-based, not-for-profit provider of a comprehensive and cutting-edge response to HIV/AIDS.

Students gained valuable experience presenting their narratives to a broad audience, some of whom will have personal connections with the topics at hand. The visual style and concision of Pecha Kucha made it an ideal launching point for further conversations. This engaging format reflected the value of cross-disciplinary approaches to complex problems, the importance of sharing findings and stimulation audience interaction.

Total project budget: $2900

Amount awarded by the STEAM Factory: $1700 ($1200 cash, $500 space rental credit).

MOBILISE

MODELING BASED HIGH SCHOOL BIOLOGY CURRICULUM ALIGNED WITH BIOENGINEERING PROJECTS

Primary Investigators: Zakee Sabree, PhD—Assistant Professor, (College of Arts and Sciences — Evolution, Ecology & Organismal Biology), **Kathy Malone, PhD—Associate Professor, (**College of Education and Human Ecology — Science, Technology, & Mathematics)

Goals

This project is designed to conduct a modeling-based high school biology curriculum aligned with bioengineering projects by collaborating with local biology teachers and engineering educators.

Summary

MoBILiSE's emphasis is on instilling life science content knowledge in 7-12th grade students via inquiry based instruction. The teaching is grounded in science models and scientific modeling with embedded bioengineering projects. The two-year project's goal is to increase teacher and student content knowledge in biology via the usage of modeling Instruction and engineering. The project is developing curricula units for the secondary level (7-12) in which teachers guide students through the development of verbal, pictorial, algebraic and graphical representations (the 'models') of biological phenomena using engineering-informed activities. In addition, the grant supports the development of a secondary level biology concept inventory that will be used to evaluate the effectiveness of the curriculum in classrooms via pre/post testing.

The investigators of this project are STEAM Factory members that met at a STEAM Factory event. Their partnership will produce an innovative curriculum with research results that will affect not only the schools across not only Ohio, but the nation. It will also benefit the STEAM Factory membership as a whole as it serves as an example of how diverse departments can work together to affect change and produce innovative products as well as research.

Funding

Awarded a $260,000 Math Science Partnership grant by the Ohio Department of Education, renewable for at least two years and possibly up to four years.

Link

https://u.Ohio State.edu/mobiliseOhio State/

Notable Achievements:

- Developed modeling-based curriculum
- Received Math and Science Partnership grant worth $260,000

Looking Ahead:

- Design a blended MA in biology education specializing in Evolution, Ecology, and Organismal Biology

COLLABORATION CAULDRON - JANUARY 29, 2016

STEAM Factory members gathered on Friday, January 29th at the collaboration space to celebrate the inaugural Collaboration Cauldron. The night was filled with fun, conversation and opportunities for connections with the current STEAM Factory members representing over 60 disciplines. Attendees were encouraged to submit at least one idea for a potential collaboration on a PowerPoint slide and reminded that indeed, no idea is too outrageous. They were also encouraged to dine, network and perhaps create future collaborations through their participation in various activities intended to enable a wide variety of interactions. These activities included our very own interactive collaboration network bulletin board intended to highlight the high volume of varied research, teaching and outreach collaborations that exist between STEAM members, board games and questionnaires intended to develop a better understanding of STEAM network hubs.

The collaboration network board highlighted each current STEAM Factory member, including participants within the College of Arts and Sciences, College of Engineering and College of Medicine as well as 12 other Colleges and Offices within Ohio State. Members used various colors of string to indicate research, teaching and outreach collaborations with other STEAM Factory members. By the end of the evening, a colorful web was woven as a small indication of the many ways our members continue to develop connections with one another.

STEAM Factory members provided feedback on the night, including the following small sample. Donna Farland-Smith, Associate Professor in Science Education, commented “It was such an open, relaxing atmosphere. It was well worth my time, getting to know others I would never get to meet even though we work at the same place!” Leonardo Carrizo, lecturer for the School of Communication, had a great time conversing with other members. Carrizo said, “I was able to connect with Kareem Usher, College of Engineering/Austin E. Knowlton School of Architecture City and Regional Planning Section, and we started a conversation about how we might be able to collaborate on a project together.”

For many, the event served as our first “housewarming party” since the STEAM space at 400 West Rich was finally fully functional after a multi-year contract lease negotiation, design development and furnishing process. The STEAM Factory collaboration and co-working space is an agile, bright, colorful and inviting environment with lots of natural light. The space was deliberately designed to spark innovation and collaboration between STEAM members and the community.

STEAM Factory member John Beacom provided his perspective on the event, “Imagine that you have broad interests and that you like books. For anyone reading this, I think that's a safe wager. Now imagine going to a bookstore where, every time you pick up a book on a random topic, you get to talk to the

author. That's what makes the Collaboration Cauldron— and other STEAM Factory events— so much fun."

STEAM FACTORY SYMPOSIUM ON ACADEMIA – MAY 13 - 14, 2016

The STEAM Factory hosted its first interdisciplinary symposium on the topic of "Academia" on May 13th and 14th, 2016. The STEAM Factory partnered with visiting faculty from both MIT and Vanderbilt University's CURB Center

The opening reception was held on Friday night in conjunction with the STEAM Factory Open House during Franklinton Friday. Symposium attendees and their guests were invited to join a tour of the Franklinton area favorites hosted by STEAM Executive Director, Roman Holowinsky (Associate Professor, Mathematics). Attendees were then welcomed back to the STEAM Factory, where a special "Collaboration Extravaganza" was underway. It featured interactive demonstrations, activities and micro-lectures presented by STEAM faculty members to celebrate the many collaborative projects that they had worked on over the past year.

Vanderbilt University Visiting Faculty:

- **Dr. Elizabeth Meadows,** Senior Lecturer, English, Assistant Director – CURB Center for Arts
- **Dr. Ole Molvig**, Assistant Professor, History and Physics
- **Dr. Lijun Song**, Associate Professor, Sociology
- **Dr. Beth Conklin**, Associate Professor, Anthropology
- **Dr. Jonathan Gilligan**. Associate Professor, Earth and Environmental Sciences

STEAM Franklinton Friday faculty presenters included: **Chris Orban** (Assistant Professor, Department of Physics)**, Jon Brown** (Research Scientist/ Lecturer, Chemical and Biomolecular Engineering), **Paul Sutter** (Visiting Postdoctoral Scholar, Department of Astrophysics), **Rob Pyatt (**Assistant Professor, Department of Pathology), **Teddy Chao** (Assistant Professor, Department of Mathematics Education)**, Maurice Stevens** (Associate Professor, Department of Comparative Studies), **Jim Fowler** (Assistant Professor, Department of Mathematics), **Bart Snapp** (Auxiliary Assistant Professor, Department of Mathematics), **Lisa Hall** (Assistant Professor, Department of Chemical & Biomolecular Engineering) and others.

The daylong Symposium began on Saturday morning and consisted of three separate seminar topics: History of Academia, Hierarchy of Academia, and Public v. Private institutions. The afternoon session consisted of a discussion on Disciplines and collaborations, followed by two STEAM Exchange like

programs on cultivating environments for interdisciplinary research the role of direct leadership in facilitating interdisciplinary collaboration.

Curb Center:
http://www.vanderbilt.edu/curbcenter/

SYMPOSIUM SESSION ABSTRACTS

Franklinton Friday

The STEAM Factory often opens its doors to the public for "Franklinton Fridays," a neighborhood event which joins the community with local artists, innovators, and researchers, all hosting individual programs on the same night. Bigger than any single venue, you might try new food, view fresh art, or participate in a new experience yourself as you explore the building and the neighborhood. At the STEAM Factory venue, the theme of the evening is "collaboration" at its broadest. The public and members are invited to study the STEAM Factory space and interact with the various "STEAM-powered" collaborations.

***History of Academia* – Ole Molvig (Vanderbilt University)**

"How do University Cultures Change?" That was the central question of this discussion-based, open-ended reflection on the macro history of university culture over the centuries. At any given moment, universities trumpet their deep roots in medieval tradition while simultaneously promising cutting edge learning environments able to train tomorrow's innovators. But how do universities actually change (and they certainly have)? Bold leadership? Outside mandates? Reactionary? Progressive? In this session I highlighted just how recent many of the "traditional" elements of our university cultures actually are, but also perhaps question how effective intentional, directional reforms often are.

***Hierarchy of Academia* – Hugh Morris (Ohio State University)**

The hierarchy of academia has evolved and continues to evolve since the inception of the tenure track. Funding environments and consideration of financial solvency has driven the increase in positions that support teaching and research. Currently, more than half of all faculty positions are non-tenure according to the American Association of University Professors. Those support positions often enjoy a lower level of benefits and inclusion in departmental, colleagic and university level activities. In this session, a postdoctoral scholar, an adjunct professor and a professor transferring from a research-track to a tenure-track presented the challenges they currently face, leading into a discussion of potential solutions to meet their needs.

Public versus Private Institutions

Even though we all are employed as academics, we understand that our "research cultures" vary greatly depending on what field we work in. It might be less clear, however, how our "jobs" would be different if we worked at another institution. In this session, we worked in groups to identify similarities and differences between working at a large public university (Ohio State) and a smaller private institution

(Vanderbilt). We discussed pros and cons of both infrastructures and speculated which characteristics carry over to all public and private institutions and which characteristics are specific to our respective institutions.

***"Behind the Scenes" of Disciplines and Collaborations* - Sam White (Ohio State University)**

A lot of the fun—and the challenge—in doing multidisciplinary and collaborative research comes in reading work in fields completely different from your own. You might get used to some of the conventions, maybe learn some of the jargon—but as an outsider, as someone who hasn't done this work, how do you really know what's going on?

In this session, we tried to pull back the curtain on collaborations and publications in some very different disciplines. Each presenter was asked to take a favorite publication then take it apart, selecting a few passages or pages and preparing a few notes to explain what went on "behind the scenes": How did the project happen? Who really did the work? What really took up your time? What went right, or wrong, or in an unexpected way? What would the rest of us from other disciplines need to know that doesn't appear on the page or online?

STEAM Exchange: *Interdisciplinary Collaboration* – Moderated by Susan Gershman (Ohio State University)

In this STEAM Exchange workshop, we explored how individual faculty can forge productive interdisciplinary collaborations, and how institutions can facilitate these collaborations. In the first part of this STEAM Exchange, "Cultivating environments for interdisciplinary research," we broke into small groups to discuss issues relevant to faculty seeking interdisciplinary collaborations, including: variation in definitions of interdisciplinary collaboration, what academics in different disciplines need to get out of a productive interdisciplinary collaboration, and how promotion and tenure goals align with interdisciplinary research.

For the second part of this STEAM Exchange, we invited a panel of speakers to briefly address questions including: How do you, as an administrator, envision rewarding interdisciplinary collaboration? What does the administration see as roadblocks or challenges to rewarding interdisciplinary work? What is a good environment to form collaborations? What are the appropriate structures and incentives for junior faculty to succeed? We concluded with a discussion about how administrative leadership can facilitate interdisciplinary research.

CHAPTER 3:

STEAM FACTORY INITIATIVES AND SERVICES

PROMOTING DISSEMINATION

FRANKLINTON FRIDAYS

PROMOTING DISSEMINATION: FRANKLINTON FRIDAY

Franklinton Fridays are a neighborhood wide art, music, food and gallery hop that occur the second Friday of every month. The studios, businesses, and institutions of East Franklinton, including 400 W. Rich, host an art crawl for the public. The STEAM Factory, as the educational anchor of 400 W. Rich hosts a diverse array of faculty and post-doctoral presenters over a huge variety of research and outreach topics for Franklinton Friday attendees.

In November 2015, the STEAM Factory hosted its first Franklinton Friday Open House at its space at 400 West Rich. Franklinton Fridays are a monthly neighborhood art, music and food hop held the second Friday of every month. The STEAM Factory Franklinton Friday Open Houses host an ever-evolving array of Ohio State faculty, staff and student research, seminars, art and music presentations, installations, performances, and exhibitions. STEAM Factory members are invited to present demonstrations and interactive activities in the space for community members to engage with the research of the STEAM Factory during these evenings.

STEAM OUTREACH AT–A–GLANCE:

- 30+ 400 West Rich Farmers Market faculty presentations (2013-2015)
- 16 STEAM-hosted Franklinton Friday Open Houses (2015-Present)
- 70 faculty presenters at Franklinton Fridays and Farmers Markets (January 2013 to Present)
- 35+ academic disciplines represented since (January 2013 to Present)
- Over 130 undergraduate and graduate students have participated in STEAM outreach activities

Opportunities also exist for post-doc and undergraduate students to work with their cooperating professors and practice presentation skills. STEAM members that participate in Franklinton Fridays can receive letters of support from the STEAM Factory. Typically, STEAM Factory Franklinton Friday Open Houses ranges from 150-300 attendees monthly.

The STEAM Factory Franklinton Friday Open House is intended to provide a more comprehensive, experiential and detailed experience of the extensive array of disciplines, research and talent housed within the Ohio State University community through its STEAM Factory membership. Following the example of the hugely successful monthly Short North Gallery Hop, the STEAM Factory partners closely with other Franklinton Friday artisans, businesses and galleries to bring visitors access to the latest research, local art, music, and more. Current participants open for tours, exhibitions, live demonstrations and performances during these monthly programs include COSI, the Franklinton Development Association, Columbus Idea Foundry, 400 West Rich Studios, Glass Axis, Ethical Arts Collective, Magic Brush Art Studio and Franklinton Arts District.

In addition to providing faculty members an opportunity to share their research and interests with a broader central Ohio audience, the STEAM Factory outreach programming also provides Ohio State University undergraduate and graduate students the opportunity to stimulate interest in and raising awareness of their research area, and/or by receiving practical training in conducting research outreach with a diverse audience. To date, over 130 Ohio State graduate and undergraduate students have participated in STEAM Factory outreach activities at 400 West Rich.

2016-2017 FRANKLINTON FRIDAY THEMES, PRESENTERS, AND PROJECTS

June 9, 2017 – Game Night

Game Night was the theme for the June Franklinton Friday. The night featured science-themed games appropriate for all ages, including Pandemic, Evolution, Killer Snails, the DNA mutation game, Pigeonetics, Schrodinger's cats and more.

May 12, 2017 – Autonomous Vehicles

Our May Franklinton Friday focused on a discussion about autonomous vehicles. We had an expert panel discuss topics relating to issues of moral and ethical algorithms, policy implications and technological advances.

Panel Speakers included:

Keith Redmill, Assistant Professor-Clinical, Electrical & Computer Engineering, Center for Automotive Research (CAR) speaker

Don Hubin, Director, Center for Ethics & Human Values, Emeritus Professor of Philosophy

Bryan Choi, Assistant Professor, Moritz College of Law, Computer Science Engineering

Harvey Miller, Professor, Director for the Center for Urban and Regional Analysis

April 14, 2017 – STEAM Spring Student Showcase

The April Franklinton Friday featured class presentations and demonstrations from high school, undergraduate and graduate students showcasing and discussing their work with each other and their community.

Franklinton site design proposals: **Ohio State Interior Design fourth year students**

Understanding Factors Impacting Attrition of Underrepresented Students in STEM: **Gloria Chrisanty**, High School Student

Turning Carbon Dioxide to Fuels: **Josh Billy**, Undergraduate Student, Biochemistry & Chemistry

Who killed the cleaning robots in Fukushima: **Chuting Tan**, Undergraduate Student, Nuclear Engineering

Evolutionary Tree House: **Heather Glon, Natalie Hamilton, Ben Titus, Mael Glon**, Graduate Students from the Museum of Biological Diversity

Art Station: Make your own Kandinsky Tree

March 10, 2017 – Engineering Challenges

The theme of our March Franklinton Friday was fun for the whole family. The STEAM Factory partnered with COSI and **Paul Sutter,** Visiting Postdoctoral Scholar, Department of Astrophysics, to challenge our engineering skills. Activities included: Make your own Straw Rockets, what is the tallest structure you can make that supports the weight of a golf ball, what's the longest bridge you can make using only toothpicks and gumdrops, who can make the fastest propeller-powered car?

January 13, 2017 – Cat-Stravaganza

In honor of the annual Franklinton Friday Cat Show, The STEAM Factory hosted Colony Cats, an all-volunteer, non-profit organization whose mission is to address cat overpopulation in central Ohio through public awareness and spay/neuter efforts. Colony Cats brought along several of their adoptable cats and everyone had the opportunity to interact with and even adopt them. **Dr. Rob Pyatt** (Assistant Professor of Pathology) and his son, Rory, shared their volunteer experiences and discussed the importance of service. **Joelle Nielsen** (The Ohio State University Veterinary School) discussed her work as a Veterinary Social worker. **Mindi Rhoades** (Assistant Professor of Teaching & Learning) lead the "Make your own cat toy" art project.

December 9, 2016 – Festivus

The final Franklinton Friday of 2016 featured three fun, innovative, and holiday oriented activities with a make and take component associated with it. **Jason Cervenec**, Education and Outreach Director, Byrd Polar Center, spoke with participants about the importance of glaciers and lead them through making their own glaciers that they could keep for themselves. Build your own propeller cars, was a physics/engineering project using everyday items like popsicle sticks, paper clips and rubber bands to

make and race cars. We also had an art station which included paint, crayons, card stock and other art supplies.

November 11, 2016 – STEAM for All

For our November Franklinton Friday, we featured a variety of our faculty showcasing their research with engaging demonstrations and presentations.

Re-Conceptualizing Food Access: Why Perception Matters: **Dr. Kareem Usher**, Assistant Professor, Department of City and Regional Planning

Involving Families and Caregivers in Early Intervention for Children with Autism Spectrum Disorders: **Dr. Katherine Walton**, Assistant Professor, Department of Psychology

Making Space: **Dr. Paul Sutter,** Astrophysicist, Department of Astronomy, Chief Scientist at COSI

The Science of Language: **Dr. Laura Wagner**, Associate Professor, Department of Psychology

Water We All Waiting For? Playful Experimentations in Creative Chaos: **Dr. Mindi Rhoades,** Assistant Professor, Department of Teaching & Learning

October 14, 2016 – The Day After Tomorrow

For October's Franklinton Friday we featured a mystery science theatre 3K style screening of the film *The Day After Tomorrow*! Audience members participated in asking questions to our expert movie panelists which included: **Dr. Stacy Porter**, Glaciology, and Dr. **Aaron Wilson**, Atmospheric Science, from the Byrd Polar Climate Research Center, and **Paul Sutter**, Visiting Postdoctoral Scholar, Department of Astrophysics

September 9, 2016 – Summer Stargazing

The September Franklinton Friday brought lightening and virtual stargazing to life. Resident "Agent to the Stars" **Paul Sutter**, Visiting Postdoctoral Scholar, Department of Astrophysics, took The STEAM Factory on a tour of our solar system with virtual reality goggles. Guests of all ages had the chance to see the planets up close and have an Astronomy Q&A. We also had a solar telescope to show guests a variety of stars and planets once the sun

set over Franklinton. We featured two Micro lectures by **David Brown**, Visiting Scholar, Artist, and Physicist, who discussed his partnership with Matthew Faulkner on the Coupe De Foudre project, a Tesla coil musical instrument. The project, which took place at Burning Man, is a 7-meter-tall sculpture featuring a Tesla coil that shoots 2 meter bolts of lightning, musically modulated by a keyboardist at the base of installation.

PAST FRANKLINTON FRIDAY THEMES, PRESENTERS, AND PROJECTS

June 10, 2016 - Starstruck in Franklinton

For the first summer Franklinton Friday, the STEAM Factory dedicated the evening to stargazing. Resident "Agent to the Stars" **Paul Sutter**, Visiting Postdoctoral Scholar, Department of Astrophysics and **Stephan Frank**, Post Doctoral Researcher, Department of Astronomy answered questions and presented star themed activities including a live cam of the surface of the sun and how to create a Hertzsprung-Russell Diagram.

May 13, 2016 - Collaboration Extravaganza

As a prelude to STEAM's Symposium on Academia, the May Franklinton Friday was used as a way to celebrate to collaborative projects that STEAM members had worked on over the last year. Micro lectures were given by the participants.

Buckeye VR: **Chris Orban,** Assistant Professor, Department of Physics, and **Jon Brown,** Research Scientist/ Lecturer, Chemical and Biomolecular Engineering

Bringing Science to Life through Dance: **Paul Sutter,** Visiting Postdoctoral Scholar, Department of Astrophysics

Collaborations in Informal Science Education: Columbus Science Pub and the JW Family Science Extravaganza: **Rob Pyatt,** Assistant Professor, Department of Pathology

That's Not Fair: Teaching Mathematics For Social Justice in Early Childhood: **Teddy Chao,** Assistant Professor, Department of Mathematics Education and **Maya Marlowe,** Teacher Columbus City Schools

Playing in the glow of catastrophe: New approaches to trauma, injury, and our complex world: **Maurice Stevens,** Associate Professor, Department of Comparative Studies

Affordable textbooks with Ximera: Not just cheaper, better!: **Jim Fowler,** Assistant Professor, Department of Mathematics and **Bart Snapp,** Auxiliary Assistant Professor, Department of Mathematics

Designing Molecules and Nanoparticles for 3D Printing: **Lisa Hall,** Assistant Professor, Department of Chemical & Biomolecular Engineering**,** and **Vishnu Sundaresan,** Assistant Professor, Department of Mechanical and Aerospace Engineering

April 8, 2016 – Creativity

For the April Franklinton Friday our presenters wanted to exemplify how being creative can impact research and be used for outreach opportunities and make meaningful impact outside of traditional academia.

Designing Molecules and Nanoparticles for 3D Printing: **Lisa Hall,** Assistant Professor, Department of Chemical & Biomolecular Engineering

Planning Creative Cities: Global Trends, Local Action: **Shoshanah Goldberg-Miller,** Assistant Professor, Department of Arts Administration, Education, and Policy - created the "Creativity Cauldron" in preparation for the May 12th Barnett Symposium,

Lasers. Telescopes. Dance. Jello. All these things have something in common, and you'll find out what at the STEAM Factory: **Paul Sutter,** Visiting Postdoctoral Scholar, Department of Astrophysics

March 11, 2016 - Frozen in Time

For the March Franklinton Friday, the STEAM Factory partnered with the Byrd Polar research Center of Ohio State to present interactive presentations and activities for community members involving all things glacial. Activities included:

Selfie Station with Polar Gear: **Jason Cervenec**, Education and Outreach Director, Byrd Polar Research Center

3D Printing and Paleoceanography: **Geoff Dipre**, Graduate Student, Paleoceanography

Simulated Snow and Peruvian Expedition Ice Core Paleoclimatology: **Emilie Beaudon, Alessia Cicconi, and Giuliano Bertagna**, Byrd Polar Research Center

Mummified and Petrified Wood under Microscopes: **George Grant and Joel Barker**, Byrd Polar Research Center

Polar Meteorology and El Nino: **Julien Nicolas**, Byrd Polar Research Center

February 12, 2016 - Kepler's Music of the Spheres: Harmonies in Mathematics, Music, and Physics

A multi-faceted presentation of the viewpoints of three distinctly different academic fields on the research of Johannes Kepler and his treatise, Harmonices Mundi, and his impact in their respective disciplines. Presenters: **Anna Gawboy**, Assistant Professor, School of Music, **Matthew Kahle**, Associate Professor, Department of Mathematics, **Paul Sutter**, Visiting Postdoctoral Scholar, Department of Astrophysics

December 11 & 12, 2015 - Holiday Open House and Festivus

It's "Ask a Spaceman" Live!: **Paul Sutter,** Visiting Postdoctoral Scholar, Department of Astrophysics. Our resident astrophysicist answered questions so that Franklinton could experience complete knowledge of time and space! We also showed off some cute and fun physics-themed toys!

Portraits and Light Modifiers: **Leonardo Carrizo,** Lecturer**,** Department of Communications - A fun photography portrait session using off-camera flash and multiple light modifiers to achieve different looks.

Crazy Cool Chemistry with Dr. Nancy: **Nancy Santagata**, Visiting Scholar, Department of Chemistry and Biochemistry created slushies, frozen snacks, and a spirit of fun with liquid nitrogen.

Feeling molecules: interactive computer simulations of polymers: **Lisa Hall**, Assistant Professor, Department of Chemical and Biochemical Engineering. See and feel how long chain molecules behave using a 3D monitor and joystick!

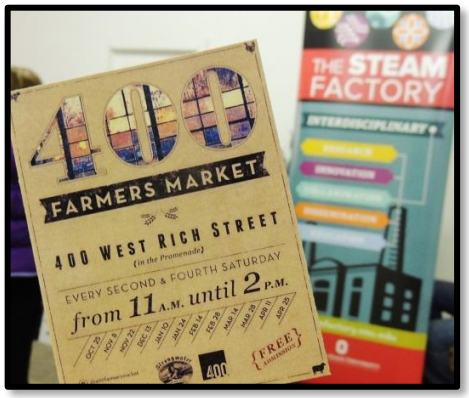
The Lottery of Life: How does the luck of the draw impact whether American children succeed?: **Lauren Jones**, Assistant Professor, Department of Human Sciences - Food, Toys, and Clothing were also collected for area families at the event

November 13, 2015 – Lego Car Challenge

Lego Car Challenge**: Rob Pyatt**, Associate Professor, Department of Pathology. Kids and (adults alike) were given two sets of wheels and a mini-figure, and challenged to build a car that was both fast and safe. The finished cars were then tested for speed on an inclined track and for safety in head-on collisions. If mini-figures were ejected from the vehicles, decapitated, or cut in half, then the vehicles failed the safety test. Participants discovered that it was hard to build a car that was both fast and safe.

PAST PROGRAMMING – BIWEEKLY 400 W. RICH MARKETS 2013-15

Biweekly 400 West Rich Markets – For nearly two and a half years (from January 2013 to July 2015), The STEAM Factory's presence at the 400 West Rich markets was extremely successful in elevating community and industry recognition of Ohio State's world class research faculty. As an integral part of the 400 West Rich bi-weekly markets, The STEAM Factory embedded itself in the farmer's market setting, presenting active research to an audience outside of traditional academia. The presentation of cutting edge research in the same location as artists and vendors provided an approachable environment for members of the community.



In 2015, four (of eight total throughout the entire university) STEAM Factory faculty members were awarded prestigious NSF Early CAREER grants due, in major part, to the inclusion of STEAM market activities (documented in "broader impact" sections as well as STEAM letters of support). This innovative STEAM faculty outreach occurs at a time when many respective departments do not currently have a rewards system in place for this type of activity. Market presence has also facilitated numerous introductions to government, community and industry partners.

400 West Rich Farmers Markets Presentations. The STEAM Factory held over 25 presentations at these biweekly markets over the period January 2013 through July 2015. The audience for these events represented a wide spectrum of the Columbus community who attend farmer markets, including both young children and adults, with an average of 150 to 200 attendees at each event.

Ohio State faculty members presenting at 400 West Rich Street bi-weekly Farmers Market include:

- **Marc Ainger**, Associate Professor, School of Music.
  Topic: Reimagining Sound: With Fourier, Doppler and Max.

- **John Beacom**, Professor, Department of Physics, Astronomy, and Center for Cosmology and AstroPartical Physics.
  Topic: Universal Gravitation: Falling apples, orbiting planets, expanding universe.

- **Noelle Beckman**, Postdoctoral Researcher, Mathematical and Biosciences Institute
  Topic: Explore the diversity of tropical forests plant communities.

- **Angela Brown**, Professor, Department of Optometry
  Topic: Project Color: Color blindness: How does colorblindness influence an artist's color selection?

- **James Carlson**, Visiting Professor, Department of Mathematics,
  Topic: Noteshare.io: This is a tool to create, edit, and share lecture notes, cookbooks, manuals, essays, poetry — you name it — on the web.

- **Theodore Chao**, Assistant Professor, Department of Mathematics Education

  Topic: Your slice is bigger than mine: A Pi Day dialogue about teaching mathematics through social justice. How can parents, community members and teachers empower to use mathematics to recognize injustice in their own worlds? How can mathematics embolden children to talk about and confront this injustice?

- **Christine Charyton**, Visiting Professor, Department of Pathology
  Topic: Creativity and innovation among science and art: How does creativity and innovation differ among disciplines such as medicine, physics, art therapy, music and education?

- **Anne Co**, Assistant Professor, Chemistry and Biochemistry
  Topic: Penny alchemy.

- **Jim Fowler & Bart Snapp**, Assistant Professor and Auxiliary Assistant Professor, Department of Mathematics
  Topic: The Humanity of Calculus: Videos and online homework exercises can make Calculus more engaging.

- **Jim Fowler & Bart Snapp**, Assistant Professor and Auxiliary Assistant Professor, Department of Mathematics
  Topic: Mooculus and Ximera an online education platform, turns collaboratively created content into interactive classroom activities - it's "crowdteaching."

- **Jim Fowler & Bart Snapp**, Assistant Professor and Auxiliary Assistant Professor, Department of Mathematics
  Topic: The Topology of Surfaces: Using 3-D glasses to see how to build a surface by gluing together the sides of a polygon.

- **Anna Gawboy**, Assistant Professor, School of Music
  Topic: English concertina.

- **Susan Gershman**, Assistant Professor, Evolution, Ecology & Organismal Biology
  Topic: Ask a biologist.

- **Monica Giusti**, Associate Professor, Department of Food Science and Technology
  Topic: Project Color: Food Color and Pigments: Anthocyanins, plant pigments that increase visual appeal and nutritional value of foods.

- **Lisa Hall & Jon Brown**, Assistant Professor and Post-doctoral researcher, Department of Chemical & Biomolecular Engineering
  Topic: Interactive computer simulations of molecules: a 3D monitor and haptic joystick let you see and feel small molecules, long polymers, and micelles.

- **Matthew Kahle**, Assistant Professor, Department of Mathematics
  Topic: Seeing 4D and Circle packing puzzles.

- **Delwin Lindsey**, Professor, Department of Psychology
  Topic: Project Color: Color blindness: How does colorblindness influence an artist's color selection?

- **Michael Mandel**, Research Scientist, Computer Science & Engineering
  Topic: Music Tagging

- **Arnab Nandi**, Assistant Professor, Computer Science & Engineering
  Topic: Gestural databases

- **Emma Oti**, Graduate Student, Earth Sciences
  Topic: Arctic Sediment Cores: Interpreting Arctic Climate from Ocean Sediments through Time.

- **Rebecca Ricciardo**, Instructional Lab Supervisor, Department of Chemistry and Biochemistry
  Topic: Project Color: Inorganic pigments: A study of structure and electronic transitions in the search for non-toxic pigment alternatives.

- **Stephen Takacs**, Lecturer, Department of Art
  Topic: Camera Obscura and Victrola Obscura: an audio device transformed into optical furniture.

- **Annie Specht**, Assistant Professor, Dept. of Agricultural Communication, Education, and Leadership
  Topic: Pop [Agri]Culture: Farms and farmers have been on movie & TV screens since the 1930s. How have entertainment media portrayals of agriculture changed over time, if they've changed at all?

- **Manoj Srinivasan**, Assistant Professor, Mechanical & Aerospace Engineering
  Topic: Toys, Robots, Humans: from toys to humans, why things move the way they do.

- **David Staley**, Associate Professor - Department of History
  Topic: Is Google Making Us Stupid?: On the History and Future of the Brain-Internet Interface.

- **David Staley**, Associate Professor, Department of History
  Topic: Data sculpture: visualizing "BIG DATA."

WEBSITE, SOCIAL MEDIA, AND COMMUNICATIONS CAMPAIGN

The STEAM Factory participates in social media and other forms of communication in order to further its twin goals of collaboration and dissemination. Social media can be used to disseminate interdisciplinary research results and also to foster new collaborative projects by promoting new ideas and sharing member interests. By providing a single online presence for many different departments and research areas, STEAM Factory's communication naturally weaves together multiple research strands and prompts those viewing STEAM Factory updates to think in new and creative ways.

The STEAM Factory website is frequently updated; these frequent updates reflect the acute agility of The STEAM Factory. In order to maximize our reach while minimizing the expense of building a custom site, The STEAM Factory uses an industry standard content management system (Drupal) with a theme provided by the College of Arts and Sciences at Ohio State. The theme places STEAM Factory visually within the aegis of academia, while STEAM Factory's customizations provide a glimpse into its innovative way of breaking down departments and knowledge silos.

The website is not merely a marketing channel for STEAM Factory as a whole, but also a channel for raising awareness about its individual members. Projects are showcased on the website with text, photos and video provided by the Principal Investigator. The STEAM Factory broadly and freely promotes individual members and their departments or other affiliations on The STEAM Factory website. Such marketing adds value to core membership, encouraging greater membership and more opportunities for collaboration.

Beginning in January of 2016, the STEAM Factory website underwent a complete renovation. We began by reaching out to members in order to update STEAM member biographies with the most current information. The STEAM Factory website also began a blog that shares information on past events and achievements of STEAM members. This new feature allows for more elaborate details on STEAM events and more descriptive facts on personal STEAM member achievements. These blogs are then shared to the Facebook and Twitter accounts in order to bring social media followers back to the website. Finally, a new Events Calendar allowed viewers to see past and future events, which were posted to all social media accounts.

As of August 2017, the STEAM Factory's dedicated social media efforts continued to expand our follower base on all online marketing accounts. Our Facebook page has 785 likes from 32 different countries and each individual post reaches and average of 120 people. The Twitter account has made progress by

increasing its number of followers to 805 and averaging over 4K impressions per month. As in 2015, we conducted two Haiku Twitter contests for tickets to TEDxOhioStateUniversity and Paul Sutter's performance, Song of the Stars. Each contest accumulated high impressions: TEDx at 17.4K and SOTS at 14.3K. The success of our social media comes from reaching out to STEAM members to help us share their success to our followers.

In 2016, the STEAM Factory began to add member news updates and SPP pages which have increased its ability to market and reach audiences about the amazing things its members are doing. On the STEAM Factory website, great effort has been made to showcase the events and programs created by members and the awards and recognitions they receive. Additionally, the SPP pages on the website have been updated to document their ongoing progress and show how completed projects have turned out. Posts created on the website are always then shared on social media so that they can reach a larger and more general audience than they would if they just lived on the website.

Finally, STEAM Factory's online activities are two-way; STEAM Factory members frequently mention The STEAM Factory when speaking publicly on research that has been showcased on the website. This provides an opportunity to promote STEAM Factory in other academic circles, with a long term goal of establishing a global network of collaborating STEAM Factories, (much as the Illinois Geometry Lab was replicated elsewhere). The frequent "STEAM Factory" appearances in a wide variety of contexts encourage the broader public to envision just how expansive academia at its best, can be.

The STEAM Factory also works very closely with many outreach partners to amplify the programming and events of the factory and its community partners. External outreach partners include WCBE (90.5FM), Greater Columbus Arts Council, 400 West Rich, and Columbus Idea Foundry. The Ohio State University outreach partners include: The Office of Outreach and Engagement, Office of Research, ASC Communications, Buckeye Leadership Fellows Program, Life Sciences Network, and STEM Initiatives.

ADDITIONAL STEAM OUTREACH ACTIVITIES AND OTHER PUBLIC EVENTS

Since its founding in 2013, the STEAM Factory has been involved in a variety of outreach activities amplifying the research and interests of its Ohio State faculty members both within the university and more broadly within greater Columbus. The STEAM Factory has also partnered extensively with numerous university offices, colleges and departments to support outreach efforts for junior faculty in recruitment, orientation and retention.

One of the STEAM Factory's most developed new faculty outreach partnerships has been the New Faculty City Road Trips which began Autumn Semester, 2013. The pilot program was supported and implemented by the Office of Academic Affairs, under the leadership of Susan Williams and J. Briggs Cormier and the Office of Outreach and Engagement (O&E). These efforts have been spearheaded by Stephen Myers (Vice Provost, Outreach and Engagement) and Janis Browning (Program Coordinator, Outreach and Engagement). STEAM members regularly serve as "leads" for the excursions, providing advice and fellowship to the new faculty.

The STEAM Factory outreach activities have included the following:

THE CHAMBER BREWS – JUNE 8, 2017

On Thursday June 8th, the STEAM Factory opened its doors to host Chamber Brews for a special filled event for music lovers. Chamber Brews is a performance series that focuses on audience engagement and giving a new home to classical music. This time the event was named "In Memoriam" featuring works by Ramsey Sadaka, Maurice Ravel, Wolfgang A. Mozart, and Elliott Carte. The chamber quartet included Tom Fetherston on violin 1, Devin Copfer playing the violin 2 part, Rachael Keplin on viola, and Elisabeth Jeremica on cello.

https://www.facebook.com/chamberbrews/

REU Summer Language Pod - **May 22nd - July 28th, 2017**

STEAM Factory members Kathryn Campbell-Kibler (Associate Professor, Department of Linguistic) and Laura Wagner (Associate Professor, Department of Psychology) led a ten-week language learning pod in the STEAM Factory space that met 2-3 times a week from May through July. The Language Pod is a research lab at the Columbus Center of Science and Industry (COSI) dedicated to the study of language and the dissemination of knowledge about language sciences. The COSI research pods (called the Labs in Life) are a part of a larger COSI exhibit on the life sciences, and they are glass-enclosed research spaces where museum visitors can observe actual scientific research as it is occurring.

The program ran for ten weeks, from May 22nd to July 28th. The internship consists of three distinct elements: classroom sessions, hands-on research training and hands-on training in informal science education. The Language Pod conducts research on many different aspects of language, including how children learn their native language, how people understand language as they listen to it, how people perceive, produce, and interpret regional accents, and more. Interns learned about the ethics of human subject's research and how to appropriately recruit and consent human research participants. They also worked one-on-one with Ohio State University faculty members and contributed meaningfully to an ongoing research project. Interns were trained in informal science techniques by Ohio State faculty and COSI staff. They shadowed more experienced students and eventually will work on the floor of COSI, teaching the public about language and the mind using engaging interactive demonstrations.
http://u.Ohio State.edu/languagesciencesummer/

CreativeMornings Columbus – **May 19, 2017**

On May 19, the STEAM Factory hosted CreativeMornings Columbus led by STEAM Factory member David Staley (Associate Professor, Department of History). This month's talk featured Celeste Malvar-Stewart a local Columbus designer, who shared with us stories of her work including, DeconSTRUCTURE in Chaos, a collection of Avant-garde clothing created from deconstructed post-consumer denim that would otherwise have been waste.

CreativeMornings was started in 2008 by Tina Roth Eisenberg (Swissmiss) out of a desire for an ongoing, accessible event for New York's creative community. The concept was simple: breakfast and a short talk one Friday morning a month. Every event would be free of charge and open to anyone. Today, attendees gather in cities around the world to enjoy fresh coffee, friendly people, and an international array of breakfast foods.

https://creativemornings.com/cities/clb

COE NEW FACULTY EVENT – **MAY 12, 2017**

New faculty members from the College of Engineering were invited to the STEAM Factory for a new faculty mixer with food and refreshments.

ARTREPRENEUR SIX-WEEK WORKSHOP - **MAY THROUGH JUNE 20, 2017**

The ARTrepreneur Workshop is an annual free comprehensive professional development series for established & aspiring arts-based entrepreneurs. The series kicked off with an ARTrepreneur Recourse Party on May 4th partnering with local arts and business organizations to engage in an interactive event that introduces students and artists to local resources through fun activities.

Workshops were held at the STEAM Factory several days a week from May 8th - June 5th and included sessions on mission statement, unique value proposition, creative digital marketing, copyright law, self-employment accounting for creatives, financial planning, and business model canvas for artists. STEAM Factory Member Dr. Melissa Crum, (Education Consultant Mosaic Educational Network) lead all sessions.

https://barnettcenter.Ohio State.edu/events/artrepreneur-workshop-series-2017

https://vimeo.com/228077901

GCAC - STOP, COLLABORATE & LISTEN – **APRIL 26, 2017**

The Greater Columbus Arts Council hosted a networking event for creators, art leaders, art lovers and art advocates in the STEAM factory.

THE SECOND ANNUAL HIV PECHA KUCHA – **APRIL 17, 2017**

The Ohio State University College of Arts & Sciences and the STEAM Factory hosted the second annual HIV Pecha Kucha which featured 5 outstanding HIV-themed Pecha Kuchas from students taking an Ohio State interdisciplinary course, HIV: from Macro History to Microbiology co-taught by Dr. Thomas McDow and STEAM Member Dr. Jesse Kwiek. Students in the class worked together in small groups to tackle an aspect of HIV/AIDS and present their work in the pecha kucha format. Pecha Kucha is a presentation style in which 20 slides are shown for 20 seconds each, keeping presentations concise and fast-paced. The Pecha Kucha presentations explored interesting facets of the HIV epidemic and were interdisciplinary, meaning both a historical and scientific perspective were given on each HIV topic.

This year, Ohio State partnered with Equitas Health and Columbus Public Health to have an evening event that showcased this student work, and get scholars, students, activists, and community members together. This was an evening of dynamic presentations on HIV to share research, findings with the broader community, foster conversation between students, academics and stakeholders, and demonstrate the value of combining scientific and

arts/humanities approaches to complex issues. https://steamfactory.Ohio State.edu/events/hiv-pecha-kucha

EXCLUSIVE STEAM MEMBER INFORMAL LUNCH DISCUSSION WITH RUTHE FARMER – **APRIL 14, 2017**

The STEAM Factory along with The National Center for Women & Information Technology (NCWIT) held an informal lunch discussion with Ruthe Farmer, who was the Senior Policy Advisor for Tech Inclusion at the White House for Science and Technology Policy focusing on education, technology and inclusion of underrepresented groups. She also served as the Chief Strategy & Growth Officer and K-12 Alliance Director for the National Center for Women in Technology. https://www.ncwit.org/profile/ruthe-farmer

PUBLIC ROUNDTABLE DISCUSSION WITH RUTHE FARMER: COMPUTER SCIENCE FOR ALL - A BOLD CALL TO ACTION TO MAKE COMPUTER SCIENCE EDUCATION AVAILABLE TO ALL AMERICAN STUDENTS - **APRIL 14, 2017**

Following the informal lunch discussion, The STEAM Factory hosted a public roundtable featuring Ruthe Farmer discussing the state of computer science education across the US for K12 students.
https://obamawhitehouse.archives.gov/blog/author/ruthe-farmer

NSF EARLY CAREER AWARD: PANEL DISCUSSION – **APRIL 5, 2017**

This session featured Ohio State faculty who have won the NSF Early CAREER award and other similar funding programs. The panelists included STEAM Factory members Arnab Nandi (Assistant Professor, Computer Science & Engineering), Lisa Hall (Assistant Professor, Chemical & Biomolecular Engineering), and David Penneys (Assistant Professor, Mathematics), as well as Shayne Piasta (Associate Professor, Teaching and Learning; Recipient of the 2017 PECASE Award, U.S. Department of Education).

The objectives of this discussion were to learn about winning strategies to develop your proposal, ask questions of your colleagues to get personalized information, hear applicant perspectives regarding successful proposal, and learn how to access samples of winning proposals.

RESEARCH SPEED NETWORKING SERIES: STEAM/DISCOVERY THEMES – MARCH 30, 2017

The STEAM Factory partnered with Discovery Themes to present a new quarterly Research Speed Networking Series (Research, Short and Sweet) with targeted research topics for

smaller more intimate networking sessions that encourage faculty from all disciplines to participate. The topic for this event was Leveraging Big Data and was held at The STEAM Factory.

The Discovery themes based their networking series off of the STEAM Factory's model for research speed dating, which is to have 40 faculty present 1 slide on their research in 60 seconds. They encourage those presenting to "have fun" with it instead of being very formal in their presentation (a gong is used to aid the fun at the 60 second limit). After ~10 presenters, breaks allow people to network and ask questions of the presenters one-on-one or in small groups.

MOBILISE WORKSHOPS- MARCH 25, 2017; FEBRUARY 11, 2017; NOVEMBER 25, 2016; SEPTEMBER 28, 2016

Mobilise is a STEAM Powered Project and collaboration of STEAM Factory members Zakee Sabree and Kathy Malone whose goal is to produce a modeling-based high school biology curriculum aligned with bioengineering projects by collaborating with local biology teachers and engineering educators.
The STEAM Factory hosted four Mobilise workshops throughout the year.

MoBILiSE's emphasis is on instilling life science content knowledge in 7-12th grade students via inquiry based instruction that is grounded in science models and scientific modeling while embedding bioengineering projects. The two-year project's goal is to increase teacher and student content knowledge in biology via the usage of Modeling Instruction and engineering at the secondary level (7-12). The project is developing curricula units in which teachers guide students through the development of verbal, pictorial, algebraic and graphical representations (the 'models') of biological phenomena using engineering-informed activities.

ASTRONOMY ON TAP – COLUMBUS - MARCH 2, 2017

STEAM Factory member Christopher Orban (Assistant Professor, Department of Physics) presented his summary of Einstein's first Models of Cosmology, and how they differed from other scientists at the time, at Strongwater Food and Spirits. Astronomy on Tap is a fun evening where you can talk to real astronomers! It's a great opportunity to learn about stars, galaxies, cosmology... and find out just what the heck's going on out there in space. Short presentations in a fun and relaxing atmosphere are given followed by a chance to ask questions about anything in which you are interested. Well, anything space related anyway.

SPECIAL MEMBERS MOVIE NIGHT – FEBRUARY 10, 2017

The STEAM Factory hosted members, spouses, children and friends for a special movie and game night focused on developing community among its diverse membership. Over 35 people participated in the evening.

EQUITAS HEALTH - AFRICAN AMERICAN HIV AWARENESS EVENT – FEBRUARY 9, 2017

The STEAM Factory hosted Equitas Health for their annual community African American HIV Awareness event which featured health partners, access to resources, HIV testing in a lively environment of food, friendship and music.

SONG OF THE STARS PREMIERE – JANUARY 28, 2017

The film, *Song of the Stars*, produced by STEAM Factory member Paul Sutter (Visiting Postdoctoral Scholar, Department of Astrophysics) made its premier at the Gateway Film Center and a Q&A session with the films creators followed.

Song of the Stars is a 2016 STEAM Powered Project. It is 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. *Song of the Stars* will draw audiences into the life story of a star, including its turbulent birth in the early universe, the nurturing of a family of planets, and the loss of a companion. Led by **Seven Dance Company**, a Columbus non-profit dedicated to connecting communities through dance, the one-hour live premiere was held on April 21st at the Capitol Theater.

EINSTEIN & EDDINGTON – NOVEMBER 17, 2016

CCAPP in partnership with the STEAM factory hosted a showing of the film Einstein and Eddington in Strongwater's event space. The film was followed by a brief panel discussion led by Prof. Chris Orban (Assistant Professor, Department of Physics and STEAM Factory member) featuring's Ohio State local experts on the history of astronomy and philosophy.

CURA ROUNDTABLE DISCUSSION WITH SAM SCHWARTZ – **SEPTEMBER 21, 2016**

The Center for Urban and Regional Analysis and the STEAM Factory hosted Sam Schwartz, a former New York City Traffic Commissioner and CEO of Sam Schwartz Engineering, a firm that specializes in urban transportation planning and engineering. The discussion centered on the topic Street Smart: The Rise of Cities and the Fall of Cars. Sam writes the "Gridlock Sam" column in the New York Daily News. He introduced the word "gridlock" into the lexicon during the 1980 NYC Transit strike. https://steamfactory.Ohio State.edu/events/curas-street-smart-rise-cities-and-fall-cars

OFFICE OF ACADEMIC AFFAIR NEW FACULTY ORIENTATION – SEPTEMBER 20, 2016

The STEAM Factory engaged with new faculty regarding its mission, network and community at the annual OAA New Faculty Orientation. STEAM directors spoke with dozens of incoming new faculty regarding its mission, people and programs.

ASC NEW FACULTY ORIENTATION RESOURCE FAIR AND LUNCH – AUGUST 19, 2016

The STEAM Factory engaged with new faculty regarding its mission, network and community at the annual OAA New Faculty Orientation. STEAM directors spoke with dozens of incoming new faculty regarding its mission, people and programs.

STEAM PANEL AT WIZARD WORLD COMIC CON – JULY 30, 2016

STEAM Factory member Paul M. Sutter (Visiting Postdoctoral Scholar, Department of Astrophysics) hosted a panel at the Wizard World Comic Con on "The science behind the comics." The panel discussed the plausibility of various superheroes, the economic impact of all-powerful fights, and the cultural connection to comics over the decades! The panel also included fellow STEAM members Robert Pyatt, Lauren Jones, and Jim Fowler.

CREATE-A-THON AND ARTREPRENEUR EIGHT-WEEK WORKSHOP - MAY THROUGH JUNE 2016

STEAM Factory members Melissa Crum and Sonia Manjon (Director, Affiliate Faculty, The Barnett Center, Latino Studies) led the eight week ARTrepeneur workshop. Participants met three times a week throughout May and June 2016 in the STEAM Factory space. Through the Barnett Center and Creative Control Fest's established networks, the two-month series offered master classes led by locally and nationally renowned creatives to help seasoned and aspiring Columbus artists and Ohio State students create vibrant and sustainable careers.

While Columbus offers many programs to assist artists, The Barnett Center and its partners identified a lack in long-term comprehensive programs for art-centered businesses and students who are aspiring arts entrepreneurs. In early 2015, The Barnett Center and Mosaic Education Network came together to form the ARTrepreneur workshop series which offers three unique components to address the needs of Ohio State entrepreneurial students and Columbus artists: 1) two-month intensive series on finance, marketing, and law; 2) three-months of business workspace in Franklinton's Bottom's Up Coffee Co-op for participants who complete the program; 3) Continued professional development through quarterly arts-centered business programs sponsored by The Barnett Center, ARTfluential, and Creative Control Fest. These three components satiate the need for business oriented skill-building, while providing time to focus on their businesses, and dedicated working space in a location that supports community building and collaborations.

NSF EARLY CAREER AWARD: PANEL DISCUSSION - **April 13, 2016**

The STEAM Factory partnered with the Ohio State Office of Research (organizer of this event) and spoke to faculty attendees about the broader impact benefits of research activities provided through STEAM Factory programming opportunities at its collaboration and co-working space in Franklinton. Panelists included numerous previous award winners as well as other helpful administrative and programmatic

presenters. Throughout June and July 2016, the STEAM Factory consulted directly with nearly a dozen faculty members regarding their broader impact plans as well as provided numerous letters of support for related programming. The STEAM Factory also sponsored lunch for the workshop attendees.

HIV PECHA KUCHA - APRIL 19TH, 2016

Students from the course, HIV: From Macro History to Microbiology co-taught by Dr. Thomas McDow and STEAM Member Dr. Jesse Kwiek, presented interesting and engaging Pecha Kucha presentations at the STEAM Factory. Representatives from The Ohio AIDS Coalition, Project INK, and Equitas Health also presented in the Pecha Kucha format. The presentations spanned a wide variety of issues regarding HIV. This event was one of the first STEAM-Powered Projects.

HIV is a disease not often talked about widely in society, but on this Tuesday night at The STEAM Factory, it was all anyone could talk about. Students from the course, HIV: From Macro History to Microbiology co-taught by Dr. Thomas McDow (College of Arts and Sciences, Department of History) and Dr. Jesse Kwiek (College of Medicine, Department of Microbial Infection and Immunity) presented interesting and engaging Pecha Kucha presentations. A Pecha Kucha style presentation is a quick paced 20 slides that show for 20 seconds a piece. It requires presenters to be creative and fast on their feet.

In total, nine presentations were presented throughout the night. Six of these were by undergraduate students from McDow and Kwiek's class. Representatives from The Ohio AIDS Coalition, Project INK, and Equitas Health also presented in the Pecha Kucha format. The presentations spanned a wide variety of issues regarding HIV. A few of the topics discussed were the history of HIV research, stigma associated with HIV, barriers those with HIV face, and a new medication called PrEP that can help prevent HIV. Not only were the presentations very informative and educational, but the fast-paced style kept the audience engaged throughout the duration of the evening. There were also several breaks which allowed the audience to interact with the presenters by asking any questions they had regarding HIV.

This event was one of the first STEAM-Powered Projects, a yearly grant proposal competition facilitated by the STEAM Factory. These grants are meant to stimulate interdisciplinary projects and collaborations among STEAM Factory members. Kwiek, a STEAM Factory Member, received a grant from the STEAM Factory that made the event possible.

SONG OF THE STARS - APRIL 21, 2016

Song of the Stars is a cross-disciplinary production engaging astrophysicists, dancers, and filmmakers to create a ground-breaking performance designed to humanize science, awaken curiosity, and intimately connect audiences to the wonders of the universe. Led by Seven Dance Company under the artistic

direction of Cassia Cramer, the live premiere occurred on April 21, 2016 at the Capitol Theater in Columbus, Ohio. It was filmed and edited for national distribution.

Following the live performance, individual dance segments were recorded using specialized 360-degree cameras in order to create a unique immersive experience in planetariums worldwide, and for use in personal virtual reality (VR) headsets such as the Oculus Rift and HTC Vive.

FRANKLIN METROPARKS BOARD MEETINGS – HELD MONTHLY ON THE FIRST WEDNESDAY, UNTIL APRIL 5, 2017

The STEAM Factory hosted monthly Franklin Metro Parks board meetings monthly for over a year which were led by STEAM member Kathryn Kelley.

COLUMBUS GREEN TEAM – HELD MONTLY ON THE 3RD THURSDAY BEGINNING MARCH 2016

STEAM Member Jason Cervenac and his team at Byrd Polar Research Center at Ohio State University are members of Columbus' Green Team, a group of environmental policy advisers for the city of Columbus. The Green Team meets bi-monthly and is made up of subject matter experts, community leaders, and business leaders appointed by the Mayor. A representative from each of the city's departments is assigned to attend Green Team meetings. The Green Team is further made up of working groups to invest additional focus on a variety of projects and policy.

O&E NEW FACULTY ROAD TRIP TO THE COLUMBUS MUSEUM OF ART - MARCH 24TH, 2016

New Faculty members were invited to join Nanette Maciejunes, Executive Director, who provided a private tour of the newly renovated museum.

PI MEASUREMENT CHALLENGE - MARCH 12, 2016

STEAM Factory member John Niles took a group out to the Great Circle Earthworks for an afternoon of measuring circles and learning about mathematics at the historical site. The challenge was to measure the actual Great Circle. The Pi Measurement Challenge is collaborative outreach event organized by Niles Johnson and Richard Shiels, historian and director of the Newark Earthworks Center. The challenge invited participants of all ages to help with

the measurement and learn more about the history and mathematics of the Great Circle to measure its circumference, measure its diameter, and divide.

The perimeter of the Great Circle is the same as the perimeter of the Wright Earthworks Square about a mile away. And the area of the Wright Earthworks Square is the same as the area of the Observatory Circle attached to the Octagon Earthworks, even further away. The American Indians who built these earthworks 2000 years ago must have known the relationship between circle diameter, perimeter, and area — the number that we now call π.

TIJS VAN MAASAKKERS' PILOT TEST RUN OF OH/LEX - URBAN PLANNING INITIATIVE @ THE STEAM FACTORY AT 400 W RICH - **March 8th, 2016**

A group of Ohio State Students and Faculty met to collaborate, discuss and propose solutions to promote the city of Columbus' new agenda to connect neighborhoods. Engagement occurred with a world-class urban planning initiative, helping Ohio State faculty test and simulate tools for urban land redevelopment with an overall goal to learn how to build better neighborhoods. The STEAM Factory provided use of the collaboration and co-working space that provided easy for its professional stakeholders and encouraged people to consider alternative possibilities for land reuse.

PAUL SUTTER SPEAKING AT TEDXOHIOSTATEUNIVERSITY - **March 5th, 2016**

Paul Sutter, astrophysics scholar and STEAM member spoke at the TedxOhioStateUniversity event about the correlation between art and science. He presented his show, "Song of the Stars, which is a dance production choreographed to tell the story of a life of a star. The show was performed the following month in April 2016.

KATIE WALTON'S RESEARCH GROUP RETREAT - FEBRUARY 21, 2016

STEAM Factory hosted STEAM Member Katie Walton's Research group retreat. The workshop provided training on how to implement Reciprocal Imitation Training, and evidence-based early intervention for children with autism spectrum disorders. This workshop trained seven new student providers in preparation for an upcoming research project comparing the effects of therapist-implemented versus parent-implemented Reciprocal Imitation Training.

ZAKEE SABREE'S LAB GROUP MINI-RETREAT - SUNDAY, FEBRUARY 21ST, 2016

The Insect-Microbe Symbiosis Lab (IMSL) is seeking to hold its biannual planning meeting at the STEAM Factory space. In this meeting, the group set funding, publication and occupational goals for the next 6-12 months, reviewed past progress, and developed ongoing strategies.

O&E NEW FACULTY ROAD TRIP BY THE COLUMBUS METROPOLITAN CLUB AT COSI - FEBRUARY 9TH, 2016

New Faculty members were invited to join the Columbus Metropolitan Club, President Drake and Interim Provost McPheron to an event honoring new faculty and engaging with one another.

MLK DAY OF SERVICE - JANUARY 18TH, 2016

New faculty participants were invited to volunteer at one of many agencies across Columbus where they served with a diverse group faculty and students to honor the life and work of Martin Luther King Jr.

O&E NEW FACULTY ROAD TRIP TO THE FRANKLIN PARK CONSERVATORY & BOTANICAL GARDENS HOLIDAY MERRY AND BRIGHT DISPLAY - DECEMBER 9TH, 2015

New Faculty met with Jenny Pope, Outreach and Education Director of the Franklin Park Conservatory and toured the special holiday display at the conservatory.

STEP NIGHT OF CREATIVITY - NOVEMBER 13, 2015

The STEAM Factory partnered with the Second Year Transportation Education Program (STEP) faculty for an evening to explore the innovation and creativity that is happening in Franklinton with the STEAM Factory and the Idea Foundry. The evening included tours of the STEAM Factory space, the Columbus Idea Foundry and the galleries at 400 West Rich Street. The activity was developed with the intent of building community among STEP Faculty and showing faculty the different spaces available for use with activities with their STEP student cohorts.

O&E NEW FACULTY CAMPUS *GHOSTLY* WALKING TOUR OF THE OHIO STATE UNIVERSITY - OCTOBER 28TH, 2016

New faculty were invited to walk the campus with Stephen Myers (Associate Provost, Outreach and Engagement) to learn some spooky and creepy stories about our haunted campus.

ROLLS DESIGN WEEK TOUR - SEPTEMBER 19TH, 2015

The STEAM Factory partnered with Tim Lai, Architect at 400 W. Rich St. for a discussion about "The Future of Brewpub Design." This hour-long discussion also featured panelists Adam Benner, Land-Grant Brewing Company, and Jarrod Bichon, Hoof Hearted Brewing and was held during the annual Independents' Day Festival. Design Talks are a series of hour-long panel discussions on a variety of topics about why architecture and design matter.

BRING CARDINAL TURKSON TO COLUMBUS PLANNING MEETINGS - FALL 2015

The STEAM Factory partnered with Don Hubin (Professor Emeritus, Department of Philosophy) to host the Cardinal Peter Turkson planning meetings throughout the fall of 2015. Cardinal Turkson, president of the Pontifical Council for Justice and Peace and the first cardinal from Ghana, visited the Ohio State University for a community discussion on global sustainability on November 2nd, 2015 at the Mershon Auditorium. His discussion was followed by a fireside chat with Ohio State President Michael V. Drake. Cardinal Turkson is respected internationally as a Scripture scholar, an advocate for the poor and disenfranchised in the developing world, and a spokesperson for protecting the environment as a matter of social justice. Turkson has long made news with his comments linking ecology and human life and has become the face of climate change at the Vatican, having led the drafting process of Pope Francis's encyclical on the environment, presented at the April 28 Vatican conference on climate change and introduced the encyclical during a June 18 news conference.

BUCKEYE BACKERS - SEPTEMBER 14, 2015

The STEAM Factory partnered with Emily Creasap, Program Coordinator of Development and Community Relations at the Marion Ohio State University campus to host a group of Ohio State Marion Alumni volunteers (The Buckeye Backers) for a tour of the STEAM Factory, 400 West Rich and Franklinton. The Buckeye Backers is a group unique to Ohio State Marion and is made of community members and retired staff and faculty. Members volunteer for many events and extra duties on our campus, logging more than 500 hours of service to our campus each year.

DEPARTMENT OF ARTS ADMINISTRATION, EDUCATION & POLICY ANNUAL RETREAT - AUGUST 2015

The STEAM Factory hosted faculty from the Ohio State Department of Arts Administration, Education, and Policy at the STEAM Space for their annual team-building retreat.

NEW FACULTY CITY ROAD TRIPS - AUGUST 19TH & 20TH, 2016

New faculty were invited to join a van ride through notable neighborhoods and areas of Columbus and finish off at the Hilton- Short North for hors d'oeuvres and cocktails.

HEALTHTECH HACKATHON - JANUARY 16TH & 17TH, 2016

THE STEAM FACTORY MEMBERS ROMAN HOLOWINSKY (ASSOCIATE PROFESSOR, DEPARTMENT OF MATHEMATICS), JIM FOWLER (ASSISTANT PROFESSOR, DEPARTMENT OF MATHEMATICS) PARTNERED WITH EIGHT BRIGHT DEVELOPERS AFFILIATED WITH GDG CHERKASY, UKRAINE FOR A 2016 HEALTHTECH HACKATHON HELD AT THE COVERMYMEDS CORPORATE HEADQUARTERS IN COLUMBUS, OHIO. THE HACKATHON INCLUDED A PARTNERSHIP WITH COLUMBUS SMART+OPEN, THE STEAM FACTORY, MULTIVARIOUS GAMES, ZOCO DESIGN, COVERMYMEDS, COLUMBUS IDEA FOUNDRY AND HILTON COLUMBUS DOWNTOWN. THE 2016 HEALTHTECH HACKATHON COMBINED TWO PARALLEL HACKATHONS RUNNING SIMULTANEOUSLY IN COLUMBUS, OHIO AND CHERKASY, UKRAINE. THIS EVENT WAS INTENDED TO INCREASE MUTUAL UNDERSTANDING BETWEEN CULTURES, TO PROMOTE EDUCATION AND TECHNOLOGY, AND TO FOSTER COLLABORATIVE RELATIONSHIPS BETWEEN PROGRAMMERS AND INDUSTRY PARTNERS IN COLUMBUS AND CHERKASY.

TED X OHIO STATE UNIVERSITY - FEBRUARY 14, 2015

STEAM Factory member John Beacom (Professor in the Departments of Physics and Astronomy) joined an incredible and diverse array of speakers for this year's topic, "The Human Narrative." His research focuses on neutrinos — almost massless and almost non-interacting particles that pervade the Universe and that can reveal hidden wonders, such as the core of the Sun, stars that implode, and black holes that are gobbling away. (Trillions of neutrinos passed invisibly through your eyes as you read that sentence.)

O&E NEW FACULTY ROAD TRIP FOR COLUMBUS METROPOLITAN CLUB EVENING MIXER - FEBRUARY 10, 2015

New Faculty met at COSI with community leaders and the faculty from six central Ohio universities to reinforce their decision to live and work in Columbus.

ARENA TECH NIGHT - JANUARY 20, 2015

Giorgio Rizzoni (Professor of Mechanical and Aerospace Engineering and of Electrical and Computer Engineering) presented on the topic "The Future of Transportation for Sustainable Mega Cities." David Staley (Associate Professor, Department of History) presented on the topic "Is Google Making Us Stupid? On the Future of the Brain-Internet Interface." The standing room only audience consisted of over 150 members of the Columbus business and tech community.

O&E NEW FACULTY ROAD TRIP TO THE COLUMBUS MUSEUM OF ART - **December 9, 2014**

New faculty were met by Nanette Maciejunes, Executive Director, who provided a private tour of the museum.

TED X COLUMBUS - NOVEMBER 7, 2014

A diverse group of researchers, professors, artists, motivators and scientists tackled topics surrounding the event's theme of STEAM. The STEAM Factory's very own Director of Outreach, Jim Fowler, was amongst the impressive lineup of speakers. During his talk, "The Humanity of Calculus," Jim shares his mission to get students excited about math and improve how calculus is taught both in the classroom and on the web. He emphasized the human story of calculus and how it helps his students better understand mathematical concepts.

O&E NEW FACULTY ROAD TRIP TO FRANKLIN PARK CONSERVATORY & BOTANICAL GARDENS - OCTOBER 22, 2014.

New Faculty met with Jenny Pope, Outreach and Education Director of the Franklin Park Conservatory and toured the conservatory.

NATIONAL SCIENCE WRITERS CONFERENCE OPENING RECEPTION - OCTOBER 17, 2014

The Ohio State University hosted over 350 science writers from across the country for ScienceWriters2014. To help kick off the weekend, The STEAM Factory presented almost a dozen Ohio State faculty research and outreach projects at the opening reception of the convention. STEAM Factory presenters included: Jim Fowler (Department of Mathematics), Anna Gawboy (Department of Music), Susan Gershman (Department of Evolution, Ecology and Organismal Biology), Lisa Hall (Department of Chemical and Biomolecular Engineering), Roman Holowinsky (Department of Mathematics), Matthew Kahle (Department of Mathematics), Arnab Nandi (Department of Computer Science and Engineering),

Rebecca Ricciardo (Department of Chemistry and Biochemistry), Bart Snapp (Department of Mathematics), and Manoj Srinivasan, (Department of Mechanical and Aerospace Engineering). In attendance were writers from The New York Times, Wall Street Journal, Washington Post, Reuters, NPR, NOVA, NBC News, The Atlantic, National Geographic, Scientific American, among others.

NEW FACULTY ROAD TRIP TO COLUMBUS DOWNTOWN NORTH MARKET AND 400 W. RICH STREET. September 10, 2014.

New faculty toured Columbus' Short North, downtown, and Franklinton districts before stopping for appetizers, drinks, and conversation at a downtown restaurant.

NEW FACULTY ROAD TRIP TO THE FARM SCIENCE REVIEW - SEPTEMBER 16, 2014

New Faculty members were invited to join Columbus Metropolitan Club members for a day at the Ohio State University's three-day showcase of agricultural production, technology, and education.

UNIVERSITY EXPLORATION ADVISING PANEL DISCUSSION - AUGUST 13, 2014

The STEAM Factory directors participated on a panel discussion for a portion of a day-long University Exploration advisory staff training retreat. They shared their career trajectories and recommendations for student involvement in a variety of academic and interdisciplinary activities.

ASC STAFF APPRECIATION DAY - AUGUST 1, 2014

The STEAM Factory hosted Cheng Zhang (Post-doc with The Advanced Computing Center for Art and Design (ACCAD)) with her presentation of "The Moon Experience – A computer simulation of being an astronaut on the moon." Over 200 Ohio State students, faculty and staff attended the event.

COLLEGE OF ARTS AND SCIENCES ALUMNI TAILGATE - OCTOBER 19, 2013

This event, hosted on the Ohio State campus, attracted a large number of Ohio State alumni and their families. The STEAM Factory hosted a booth at which John Beacom (Professor, Department of Physics and Department of Astronomy) presented a demonstration on universal gravitation.

GO WEST! FESTIVAL - OCTOBER 12, 2013

Go West was a community festival held in Franklinton and presented by the Franklinton Arts District, attended by the broader Columbus community including families and children. The STEAM Factory hosted a series of demonstrations and displays at a booth, including presentations by members Anne Co (Assistant Professor, Department of Chemistry and Biochemistry), Manoj Srinivasan (Assistant Professor, Department of Mechanical and Aerospace Engineering), and Arnab Nandi (Assistant Professor, Department of Computer Science and Engineering), as well as five Ohio State graduate and undergraduate students.

CHAPTER 4:
EXAMPLES OF STEAM FACTORY MEMBER COLLABORATIONS

All of our members share in The STEAM Factory's collaborative spirit. Here are some examples of projects that our members have organized over the past couple years. Each project was supported by The STEAM Factory through administrative support, funding and/or use of the STEAM Factory space and/or resources.

OHI/O HACKATHON

Arnab Nandi and Meris Mandernach

To foster a tech culture amongst students at Ohio State and cultivate technical talent in Columbus and the Ohio region, "OHI/O" — Ohio State's Second Annual Hackathon and programming contest was held Friday October 3rd 2014 through Sunday October 5th 2014. Over 200 undergraduate and graduate student programmers built working software and demonstrated it to a live audience of students, faculty, and representatives from tech companies.

Students competed for over $5000 in prizes and were judged on categories including technical difficulty, creativity, usefulness, and presentation. OHI/O 2013 and 2014 were made possible by Hortonworks, Google, Teradata, Persistent Systems, Epic, Wexner Medical, College of Engineering, The STEAM Factory, OCIO, Ohio State Department of Computer Science & Engineering and the Open Source Club.

PROJECT COLOR

Felipe Castelblanco, Roman Holowinsky, Rebecca Ricciardo

Initial Concept: The starting point for the STEAM Factory's "Project Color" came from Rebecca Ricciardo, who coordinated the general chemistry curriculum for roughly 1000 freshmen during the spring semester of 2014. She had students create pigments from inorganic materials, produce paint from those pigments and, finally, use the paints to create works of art.

Evolution: As Rebecca shared her course activities with various members of the STEAM Factory and the outside community, it was suggested that we provide some additional incentive for the students in the form of competition in the form of a prize (e.g. gallery showings of the completed artwork with chemistry posters describing the chemical properties of the paint). The project further evolved into a study of color that went far beyond simply creating pigments from inorganic materials. The idea organically developed into a general education class examining color from various angles of research and history, thereby investigating the environmental, economic and cultural impacts of color. The course objective was to bring awareness to different issues surrounding color combining an educational component around each topic.

At the completion of Project Color, the following STEAM Factory members were involved: Rebecca Ricciardo (Chemistry and Biochemistry), Anne Co (Assistant Professor in the Department of Chemistry and Biochemistry), Monica Giusti (Assistant Professor in the Department of Food Science and Technology) and Felipe Castelblanco (Fergus Family Visiting Artist in the Urban Arts Space).

As part of this project, four presentations were held at the 400 West Rich Market (spring 2014) and an online competition was held for student artwork generated as part of the course. Photographs of the artwork were uploaded to The STEAM Factory's Facebook page (www.facebook.com/theSTEAMfactory), and nearly 10,000 people interacted with the site to vote for their favorite piece of art. The winning artworks were displayed at the Imagine400 Showcase held at 400 WEST Rich on April 25, 2014.




BROWNIE IN MOTION: AN ITINERANT ART INSTALLATION

Stephen Takacs

Brownie In Motion is a project by STEAM Factory member Stephen Takacs (Lecturer in the Department of Art), which was funded in part by the Outreach and Engagement Impact Grant awarded to The STEAM Factory in 2013.

The Brownie in Motion is a modular, room-sized camera obscura that functions as an immersive art installation, a functioning camera, photographic darkroom, and a didactic tool. Physically, this piece is a to-scale replica of an iconic Kodak Brownie box camera that has been enlarged 18.5 times to a footprint of 5' 3" x 8' 5", with a height of 8'.

At the SPE Midwest Conference in Nebraska.

Viewers of *Brownie In Motion* are encouraged to enter the installation and "become the camera." On the front of the camera are a lens and a small infrared sensor connected to the camera shutter. When the sensor is activated by motion, it opens the shutter allowing light to enter via the lens. The lens projects an upside-down image of the exterior onto a large spool of thin transparent fabric in the interior of the camera. This allows the participant to gaze at the outside world from inside the object in a manner similar to camera obscuras that were popular in 18th and 19th century.

Within this camera obscura, the everyday world is re-contextualized by literally turning the perception of the world on its head. The analogue image capture technology in *Brownie In Motion* is different than most modern image making devices, though the concept and the optical phenomenon of the camera is still the same, and serves as a powerful and engaging teaching tool.

Stephen is using his camera not only to educate but to create an important ongoing series of photographs that document practitioners of disappearing crafts and trades. All of the black and white images in this series are shot and chemically developed by hand inside of the camera obscura, much like early itinerant photographers of the 19th century.

Stephen has toured the nation with this project. The project has been displayed at the Cleveland Ingenuity Festival in September 2013, the Columbus Mini Maker Faire held at COSI in October 2013, and the 2013 Society for Photographic Education Midwest Conference in Lincoln, Nebraska.

Takacs has conducted a series of demonstrations using the camera obscura at a wide variety of venues and events, including:

- The 400 West Rich Winter Market on December 14, 2013. The audience for this demonstration was the regular variety of market goers (see metrics for these markets in the next report section).
- COSI's After Dark events held on January 10, 2014 and June 5, 2014. The target audience for these events was adults from all over the Columbus area. At the "Steampunk Carnival" event on June 5, Takacs used a photobooth-style presentation to capture photographic images of event participants.

At the Cleveland Ingenuity Festival

- 51st SPE National Conference | Collaborative Exchanges: Photography in Dialogue (Baltimore, MD)
- March 6 – 9, 2014: 2014 Nationwide Children's Hospital Starry Night Family Festival held at the Westerville South High School on April 6, 2014. The audience included families from Westerville and surrounding neighborhoods.
- Imagine400, a showcase gallery held at the 400 W. Rich event space on April 25, 2014. This event attracted over 300 attendees from Franklinton and the Columbus community.
- Ohio Camera Collectors Society Annual International "Original Collectors Show" held in Columbus on May 17, 2014. The audience for this event included camera enthusiasts from central Ohio.
- Columbus Idea Foundry Open House event held at the Columbus Idea Foundry site in Franklinton on June 1, 2014.
- The 2014 Great Oregon Steam Up at Antique Powerland in Brooks, Oregon.
- Penland School of Craft in Asheville, North Carolina.

Internet resources and links resulting from this work include:

- http://makezine.com/2014/06/05/giant-interactive-camera-obscura/
- http://www.simplifiedbuilding.com/blog/portable-frame-for-traveling-camera-exhibit/
- http://www.lomography.com/magazine/lifestyle/2014/06/04/an-interview-with-photographer-stephen-takacs
- http://614columbus.com/2014/06/a-photograph-worth-a-hundred-years/

RECREATING ALEXANDER SCRIABIN'S TASTIERA PER LUCE

Anna Gawboy

Anna Gawboy (Assistant Professor, School of Music) used STEAM Factory funding to help bring a public performance of her research to fruition. Gawboy spent a weeklong residency at Utah State University on November 18-23, 2013, which culminated in a lighted performance of Alexander Scriabin's Prometheus, Poem of Fire op. 60 with the Utah State University Orchestra and combined choirs, conducted by Laura Jackson.

The piece was composed in 1910, and represents the earliest attempt to combine music and colored lights in a multimedia spectacle. In the past, the work was seldom performed, and when it was, designers frequently ignored Scriabin's obscure indications and inserted their own visuals. Gawboy's research, based on analysis of archival materials, filled in many gaps regarding Scriabin's vision.

While in Utah, Gawboy had the opportunity to work closely with several students and involve them in critical aspects of the performance. Gawboy addressed several classes, which ranged in size from 10 to 900. Gawboy also delivered three lectures "Color-music relations in Scriabin's Prometheus, Poem of Fire," "Interpreting Scriabin," and a pre-concert talk about the performance that was streamed live. Gawboy also sat on two panels: "Western Esotericism and the University," with Chris Scheer, Marco Pasi, and Brian McCuskey, and "Performing the Poem of Fire," with Laura Jackson and Chris Scheer. She additionally participated in the workshop: "Writing Program Notes" co-facilitated with Chris Scheer.

The audience for this work included the students and faculty of Utah State School of Music, the wider Utah State University community, and the general public in Logan, Utah.

In addition, Gawboy gained substantial research scholarship benefit from this work. She notes the following:

"Public performance is the most comprehensive, authentic way I can disseminate my research in this piece to the public. Each time I design a performance, adapt it to a new environment, and communicate it to a new audience, I learn new information about the work itself. Since I intend to stage this piece in the future, I will use this information to develop my interpretation of the piece further."

Internet resources, documented stories and links resulting from this work include:

- http://www.york.ac.uk/history-of-art/enchanted-modernities/scriabin-holst-concert/
- http://www.laurajackson.net/web/events.aspx?date=11%2F22%2F2013
- http://cachevalley.fox13noWestcom/m/h/events?ct=d&evid=281878942
- http://eventful.com/logan/events/prometheus-poem-fire-/E0-001-059734883-4
- http://www.usu.edu/ust/index.cfm?article=53323
- http://usuartnews.blogspot.com/2013/11/visitors-coordinate-concert-at-utah.html

STEAM MATH CIRCLES

Bart Snapp, James Fowler

STEAM Math Circles is a workshop-based educational series aimed at students and teachers in middle school, where a large attrition occurs in science and math.

Broadly, STEAM Circles aims to excite students and collaborate with teachers to think about real-world problems at the level of grade-specific course curriculum.

The STEAM Math Circles will build on the existing Math Circle program for students, organized collaboratively between college faculty, mathematics teachers and administrators, including STEAM Factory members Bart Snapp and Jim Fowler.

Jim Fowler and Bart Snapp worked with Columbus Math Circle Workshop for Teachers to host immersive multi-day mathematics workshops for junior high school teachers. This multiday immersion workshop was organized collaboratively between college faculty, math teachers, and administrators. Each session explored mathematical concepts like proof and reasoning, synthetic geometry, optimization, basics of graphing, problem posing, and counting arguments. STEAM Circles crossed disciplines, including mathematics, hydrology, environmental economics and aerial acrobatics, to promote a holistic consideration of multiple perspectives in addressing real world problems.

Link: http://www.mathcircles.org/Wiki_WhatIsAMathCircle

Looking Ahead:

Working to apply Math Circes format to other subject areas:

- Aerial Acrobatics
- Environmental Economics: used to determine water flow rates and extent of water pollution.

CIRCLE PACKING PUZZLES

Matthew Kahle

Through STEAM Factory funding, Matthew Kahle utilized the skills and equipment at the Columbus Idea Foundry by commissioning the construction of a Packing Circles puzzle. Circle packing is the study of the arrangement of circles of equal or varying sizes on a given surface so that no overlapping occurs and all circles touch another. The associated "packing density" of an arrangement is the fraction of the surface covered by the circles. Kahle constructed the packing circles puzzle as a means of exploring this mathematical problem in a tactile way, thereby making the challenge accessible to a wider range of people. "Most of this body of work is on packing objects in Euclidean space, which is infinite. But the problems become even harder if you try to pack them in a finite region, such as a square," Kahle says.

To begin the project, Kahle gave Bandar all the specifications, including exact dimensions for each puzzle. Through The STEAM Factory's Outreach and Engagement Impact Grant, Bandar was able to laser cut the packing circles to specifications. The puzzle was brought to the STEAM Factory's booth at the 400 West Rich Farmers Market on November 9, 2013, where a wide audience played with it including children of varying ages. The larger impact of this project is providing a more efficient way to pack and ship goods.

An article about this project can be found online at: https://steamfactory.Ohio State.edu/news/discovery-surprise.

Funding

Funded in part by the STEAM Factory 2013 Outreach and Engagement and Impact Grant

Notable Achievements:

- Creating a challenging puzzle which was demonstrated for a public audience
- 10 year old came up with novel solution

Looking Ahead:

Need funds to create more puzzle prototypes for possible commercialization

LINKING ECONOMICS IN HYDROLOGY

A COUPLED MODEL OF THE PHYSICAL PROCESSES AND ECONOMIC BEHAVIOR IN THE UPPER BIG WALNUT CREEK WATERSHED

Sathya Gopalakrishnan, Gaj Sivandran

Goal:

1. To develop a coupled model linking agricultural decisions and the hydrological processes determining the transport of pollutants from a watershed to a receiving water body

2. To combine economic and hydrology information in the Upper Big Walnut Creek watershed to validate the model and estimate cost benefit parameters to determine the agricultural input decisions.

Summary: Humans are constantly changing the environment surrounding them. Understanding the multidirectional feedbacks between human behavior and natural systems often requires more than just superimposing an economic model on the bio-physical system. Using the assembled data as a baseline to simulate alternative climate and land use scenarios, we also examined the potential impact of climatic change on water quality in the Hoover Reservoir. The newly developed research capacity provided insights for long-term solutions as policymakers today grapple with balancing a growing demand for agricultural output and sustainable management of aquatic ecosystems.

Funding: 2013 Seed Grant - Ohio Agricultural Research and Development Center

Publications:

- Liu, Gopalakrishnan, Browning, Herak and Sivandran, “Estimating the impact of water quality on surrounding property values in Upper Big Walnut Creek Watershed”, Selected Paper for presentation at the Agricultural & Applied Economics Association’s 2014 AAEA Annual Meeting, Minneapolis, MN, July 27-29, 2014.
- Liu, Gopalakrishnan, Browning, Herak and Sivandran, “Estimating the impact of water quality on surrounding property values in Upper Big Walnut Creek Watershed”, 2014, in Preparation for submission to Land Economics.
- Browning, Callaway, King and Sivandran, 2013. SWAT modeling of nutrient fluxes into surface waters under increased climate variability. Gordon Conference Catchment Science: Interactions of Hydrology, Biology and Geochemistry, Andover NH.

Notable Achievements:

- Mentoring for one PhD candidate and two Masters students
- Held events on climate change connecting hydrology and economic tradeoffs organized by Science Education Council of Ohio with Sam White for high school science teachers

Looking Ahead: Need funding for more Graduate Student support to do more integrated modeling

OH-LEX: OHIO LAND EXCHANGE

Mattijs Van Maasakkers, PhD—Assistant Professor
College of Engineering— City and Regional Planning

Summary
In the 1800s, during the Industrial Revolution, there was not enough space. Dense populations swarmed into cities hoping to get a piece of the American Dream. In response to these growing cities, land was strategically mapped out to accommodate large amounts of people, and even more land was planned out when those people started their own businesses.

But what happens when the opposite occurs? What happens when people pack up and leave these cities, abandoning their land and structures previously used to house their businesses?

The Ohio Land Exchange plans to address exactly that. Starting with Lima, Ohio, the program hopes to encourage stake-holders that are interested in more space (such as Head Start Lima) to negotiate and share structures in the city, and ultimately turn those tax deficiencies into productive lands.

Van Maasakkers, along with two co-principal investigators, Kristi Cheramie and Jacob Boswell, started the project in the summer and plan to work with the city of Lima for two years, and hopefully move on to other cities in Ohio after that.

The first phase of the OH-LEX is interviewing prospective stakeholders. Then, a map will be constructed based on the areas that each organization likes. If their interests overlap, a negotiation is planned to try to accommodate the needs of each group.

12 students headed out into Lima neighborhoods on Oct. 3 to begin surveying the land. This project is a perfect example of a community-university partnership .It provides the city very detailed data about the condition and economic viability of some of these properties. The university with its much more advanced tools and equipment can take the data, synthesize it, and bring it back in a way that becomes economically useful."

Funding
Outreach and Engagement Impact Grant — Awarded $30,000

Notable Achievements:

Intended Results—

- Create maps of ideal sites for stakeholders
- Apply this method to other shrinking Ohio cities

2016 PI MEASUREMENT CHALLENGE

Niles Johnson, PhD—Assistant Professor, *College of Arts and Sciences — Mathematics*

Summary

The Pi Measurement Challenge is collaborative outreach event organized by Niles Johnson and Richard Shiels, historian and director of the Newark Earthworks Center. The challenge invited participants of all ages to help with the measurement and learn more about the history and mathematics of the Great Circle to measure its circumference, measure its diameter, and divide.

The perimeter of the Great Circle is the same as the perimeter of the Wright Earthworks Square about a mile away. And the area of the Wright Earthworks Square is the same as the area of the Observatory Circle attached to the Octagon Earthworks, even further away. The American Indians who built these earthworks 2000 years ago must have known the relationship between circle diameter, perimeter, and area — the number that we now call π.

Four teams participated, two for circumference and two for radius. After averaging the teams' measurements, here are the results:

Circumference: 3372.5 ft.

Diameter: 10171.5 ft.

π Measurement: 3.1474

Percent Error: 00.19%

PROTOTYPING FUTURE LEARNING EXPERIENCES — PHYSICS EDUCATION WORKSHOPS

David McKenzie, MFA Candidate, ***College of Arts and Sciences — Department of Design***

Goals

Prototyping with a non-designer team of physics faculty, staff and students to co-design an ideal student learning experience for Introductory Physics students

Summary

This project began by identifying and conducting interviews with a small group of faculty, staff, and students about the current learning environment of an introductory physics class at Ohio State. Next, the group separated into formal workshops where group members created a display of their ideal physics learning environment. Results found that the faculty workshops produced an integrative lecture and lab studio-style set-up while the student workshop provided ideas for a more abstract layout, including a GPS app and methods for TAs to connect with students who were not physically in attendance. A third workshop was conducted to integrate the ideas proposed by the faculty and students. The outcome was a proposal for a GPS-enabled application that would allow students studying the same subject to form local study groups and receive virtual support from instructors and teaching assistants.

Link

http://davidmckenzie.co.uk/2015/12/01/prototyping-future-learning-experiences/

Notable Achievements:

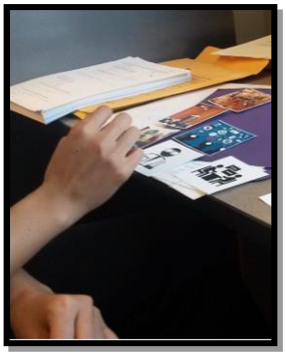
· Using a prototype “seed” method to solve abstract problems

· Groundwork for a local study group GPS app

Looking Ahead:

· Developing the GPS app

· Expanding the learning method across other departments’ teaching methods



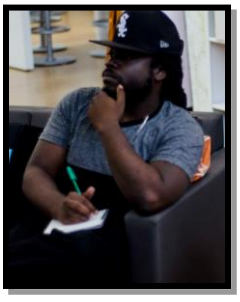
CREATE-A-THON AND ARTREPENEUR WORKSHOP SERIES

Melissa Crum *—Founder, Mosaic Education Network*
Sonia Manjon *— Director, Affiliate Faculty, The Barnett Center, Latino Studies*

Summary

Columbus is ranked the 6th most creative city in the US (Wallace, 2015). However, the research grounding this ranking does not reflect local artistic entrepreneurs' level of success or the business support available to make a creative enterprise profitable. While Columbus offers many programs to assist artists, The Barnett Center and its partners identified a lack in long-term comprehensive programs for art-centered businesses and students who are aspiring arts entrepreneurs. In early 2015, The Barnett Center and Mosaic Education Network came together to form the ARTrepreneur workshop series which offers three unique components to address the needs of Ohio State entrepreneurial students and Columbus artists: 1) two-month intensive series of finance, marketing, and law; 2) three-months of business workspace in Franklinton's Bottom's Up Coffee Co-op for participants who complete the program; 3) Continued professional development through quarterly arts-centered business programs sponsored by The Barnett Center, ARTfluential, and Creative Control Fest. These three components satiate the need for business-oriented skill building, time to focus on their businesses, and dedicated working space in a location that supports community building and collaborations.

Workshop participants met three times a week Tuesdays, Wednesdays, and Thursdays through May and June 2016 in STEAM Factory space 400 Rich in Franklinton. Through the Barnett Center and Creative Control Fest's established networks, the two-month series also offered master classes led by locally and nationally renowned creatives to help seasoned and aspiring Columbus artists and Ohio State students create vibrant and sustainable careers.



MOOCULUS:

Jim Fowler

Summary:

Calculus One is a massive open online course held on Coursera and YouTube, featuring over 25 hours of video and exercises. Jim Fowler taught and designed the course with an emphasis on practice problems instead of just lecturing. The 16 week course was first made available in Spring Semester of 2012-2013.

Jim Fowler's team used Ruby on Rails to build the platform, and used Khan Academy as a framework to build the practice problems in MOOCULUS. The course begins with an introduction to functions and limits, then moves into derivatives, linear approximation, and ends with sections on integration. The set up encourages peer to peer and student instructor interaction. MOOCULUS sees a diverse group of students, involving more older learners than most online courses, and young people from all over the world, including a 14 year old girl in Pakistan.

The practice problem software also allows for data to be collected on more than the number of problems that are answered correctly. It also includes the amount of time taken on a problem and number of hints that were used. This form of data collection illuminates the ways that students learn and practice and also offers methods to design future online learning courses.

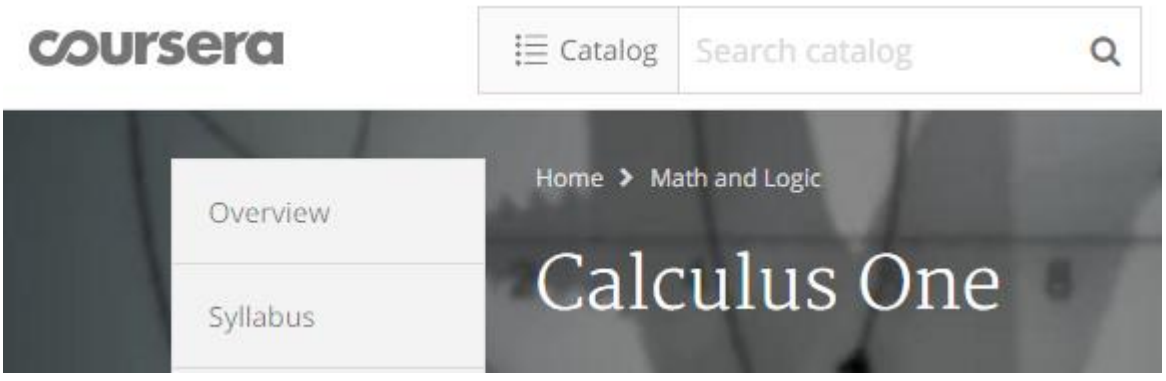
The MOOCULUS platform has expanded to allow people to log in using their Google ID, allowing students to access the course from anywhere, at any time.

Looking Ahead:

- Creating an Interactive Textbook
- Making more Interactive worksheets

Notable Achievements:

- More than 250,000 Participants
- YouTube Channel surpassed 1 million moves



CHAPTER 5:
FACULTY ENGAGEMENT & MEMBER SERVICES

FACULTY ENGAGEMENT

STEAM Factory membership is open to faculty, staff and post-doctoral researchers within the Ohio State University. Membership is provided free of cost to the STEAM Factory programming and activities and membership services are specifically designed to support its Ohio State faculty in the development of academic network building in order to facilitate innovative collaborations in research, teaching and service within the university and greater Columbus community. These programs include both the core formal STEAM programs such as STEAM Exchanges, Franklinton Friday Open Houses, Columbus Science Pubs, as well as informal programs and services.

The STEAM Factory is composed of primarily faculty members comprising over 85% of our current active members. Some key membership statistics include the following:

- 85.3% of STEAM membership are faculty
    - 50.5% of STEAM faculty members are assistant professors
- 700%+ growth from June 2014 to present

In addition to the many externally facing programs, there are many STEAM services and benefits that are offered exclusively to membership and enable a variety of options that increase faculty engagement among diverse academics. These benefits include: nearly unfettered access to the STEAM collaboration and co-working space which increases the possibilities of conversations among academics who may never run into one elsewhere on campus; access to the ever-expanding STEAM member network; provision of research letters of support for broader impacts; participation in interest specific and member-driven working groups, invitations to formal and informal member events; and amplification of STEAM member events and successes through STEAM Factory marketing efforts, among others.

BENEFITS OF STEAM PARTICIPATION

The STEAM Factory provides a unique opportunity for researchers since the combined expertise of the entire membership can be leveraged for cross-mentoring of interdisciplinary research. Increasingly early career faculty are being encouraged by their Deans, Department Chairs, faculty mentors and colleagues to seek out involvement with the STEAM Factory to increase their network quickly upon their arrival at Ohio State. Faculty scholarship and networking benefits to the faculty members directly feed back into the engagement partnership by providing additional avenues of research to discuss at public events, developing new and improved materials for disseminating research in an engaging manner and enhancing the skill of faculty members in discussing their research with the community.

The STEAM Factory contributes to the scholarship of research, teaching and outreach for its members. The scholarship is and will be documented in a variety of different forms, including, but not limited to: journal papers written as part of research collaborations, presentations made at academic conferences and public events, videos made of presentations at public events, displays and exhibits that will be uploaded to the Ohio State Knowledge Bank.

Specific ways in which The STEAM Factory programming and activities benefit STEAM members include:

- Opportunities for enhanced cross-faculty interaction, inspiration, engagement and research collaboration
- Introductions to a widely diverse and engaged faculty community
- Transfer of teaching skills, techniques and tools across research disciplines
- Development of new methods for displaying, visualizing and disseminating research
- Training and opportunities for enhanced engagement with a broad public audience
- Opportunities for undergraduate and graduate student-driven research dissemination training for public outreach and engagement
- Development of community and industry partner relationships
- Feedback on publicly-funded research
- Access to a wide variety of community engagement opportunities

MEMBER ACCESS TO THE STEAM COLLABORATION AND CO-WORKING SPACE

The STEAM Factory collaboration and co-working space is one of over 130 studios at 400 W. Rich. This nearly 3,700 square foot space offers:

1. Conference room space, a larger co-working area, a kitchenette facility, one and half bath with a shower (in case you like to bike, do yoga or work-out throughout your day) as well as smaller rooms for those that need a private space for work.

2. A bright and welcoming work environment with vaulted ceilings and skylights where our members can come and escape from the everyday routine of their campus or home office space.
3. As a member, the space is open 24/7 for access. Members are provided access via a special access codes into the building and a key to the STEAM space.
4. The space can also be reserved as an agile venue to host student classes, departmental meetings, research meetings, lab groups, roundtable discussions, visiting lecturers, community and industry interest group meetings, and presentations, often at no or significantly discounted cost to members. The STEAM Factory has installed a space rental policy detailing the specifics of larger group space requests by both STEAM members as well as those outside of The STEAM Factory and in the larger Columbus community. Reservations must be made through Charlene Brenner, Project Coordinator for The STEAM Factory.
5. 400 W. Rich is a convenient, easily accessible location with ample parking and other area amenities including Strongwater restaurant, Land Grant Brewery, multiple art galleries and is also a short walk to other downtown locations including COSI, The Columbus Idea Foundry and the newly renovated Scioto Mile Metro Park.
6. Access to the STEAM Factory space reservation and membership events calendars which keeps members apprised of space use reservations and upcoming events.
7. 54% of STEAM members have used the STEAM Factory for co-working – data based upon a Fall 2017 STEAM Factory membership survey

ACCESS TO STEAM MEMBER NETWORK

Membership Network = Connections Magnified

The STEAM Factory fosters and encourages collaboration between its ever-growing community of members and beyond. STEAM provides many diverse opportunities for members to meet other academics from various departments who may not have typically met throughout their daily activities on campus. Members form professional and personal connections that often lead to amplification and further development of traditional and non-traditional research, teaching and service projects as well as provide opportunities for new interdisciplinary ventures and an unlimited possibility for additional opportunities to which members may not have been otherwise exposed.

Members can readily receive information on STEAM events, research and news via the membership listserv. Members are also able to readily contact their widely diverse community of fellow STEAM members with opportunities for collaboration, requests for resources and information on different news items, events and programs. A wide variety of inquiries have been posed to the membership listserv including searches for grant collaborators, requests about how to integrate technology into classroom teaching and crowdsourcing opinions about the effectiveness of research tools. There have even been requests seeking members to serve on the scientific panel at the Wizard World Comic Con. Members have access to an amazing breadth and depth of expertise via the STEAM membership listserv. Members with

interesting challenges, questions and ideas are encouraged go ahead and throw it out to our membership for thoughts, recommendations and input on helpful resources.

RESEARCH SUPPORT

Professional Development

STEAM hosts and participates in various professional development opportunities for members including interdisciplinary seminars and professional development panels. Members form lasting professional connections by collaborating and engaging with fellow STEAM members, as well as gain professional experience presenting research to both peers and the community through a variety of outreach opportunities. The STEAM Factory also recently organized a Professional Development Working Group led by faculty interested in finding unique and innovative ways to further address the professional opportunities, challenges and skills needed to further members' professional endeavors.

Research and Writing Groups

Members have developed ongoing writing groups and writing retreats to meet in the STEAM Factory space and work on writing research, publications and grant proposals. These meetings are scheduled by members at their convenience using the STEAM space as a central meeting hub.

Grant Opportunities

The STEAM Factory has played an important role in obtaining grants for both individual and collaborative projects for its members through writing letters of support, providing a vehicle to amplify the broader impacts of Ohio State faculty research and developing its own collaborative grant submissions. Further, in 2016 The STEAM Factory developed the STEAM Powered projects grant for STEAM Factory members which has now funded three rounds of STEAM member collaborations in research, teaching and outreach.

Letters of Support

The STEAM Factory provides its members with grant proposal Letters of Support. As of July 2017, STEAM Factory members have been awarded over $9 million in grants that have included nearly 70 STEAM Factory letters of support. These letters of support have included awards of multiple NSF Early CAREER grants with strong positive NSF reviewer comments for STEAM's high impact broader impact opportunities.

MEMBER ONLY SPECIAL EVENTS/PROGRAMS

In addition to STEAM events that are open to the public, the STEAM Factory hosts many types of events and programs designed specifically for members as a way to better facilitate connections, collaborations and conversations among academics from different fields. The STEAM Factory regularly programs formal and informal special events for our members to inspire, socialize, network, and enjoy each other's company. STEAM provides faculty and staff casual settings to meet and get to know one another outside of common research or academic spaces. The community built from STEAM Factory informal gatherings

can also lead to wonderful conversations; intersections in interests and professional collaborations in the future. Past events include the Symposium on Academia, the Collaboration Cauldron, annual celebrations, informal happy hours and lunches, weekly coffee and co-working at STEAM, membership welcome events and membership meetings and more.

MARKETING AND PROMOTIONAL OPPORTUNITIES

Friends of STEAM Listserv

All STEAM Members have access to our Friends of STEAM Listserv, our general public facing mailing list that provides a broader community, business and partner audience than that within Ohio State alone. We encourage members to send information regarding special events, workshops, guest lecturers, panel discussions that they would like shared with a broad community audience.

Peer Promotion via the STEAM Factory Website and Social Media

When a STEAM member gets tenured or awarded a research grant or teaching award, we encourage them tell us! We love to share our members' accomplishments! The STEAM Factory maintains a very active online presence through its social media and website activities and often shares the accomplishments, accolades and events of its diverse and prolific STEAM membership. The website and social media channels provide not merely a marketing channel for STEAM Factory as a whole, but also a channel for raising awareness about individual members in The STEAM Factory; projects are showcased on the website with text, photos and video provided by the principal Investigator or member. The STEAM Factory broadly and freely promotes individual members and their departments or other affiliations on its website including sharing research publications, significant grant and teaching awards and other academic successes. Such marketing adds value to the STEAM membership, which then encourages greater membership and therefore more opportunities for collaboration.

Website and Social Media

The STEAM Factory website (www.steamfactory.Ohio State.edu) is frequently updated; these frequent updates reflect the acute agility of The STEAM Factory. In order to maximize our reach while minimizing the expense of building a custom site, The STEAM Factory utilizes the College of Arts and Sciences at Ohio State's standardized Drupal platform. The theme places STEAM Factory visually within the aegis of

academia, while STEAM Factory's customizations provide a glimpse into its innovative way of breaking through established departmental and knowledge silos.

 https://www.facebook.com/theSTEAMfactory/

 https://twitter.com/theSTEAMfactory, @theSTEAMfactory

The STEAM Factory participates in social media and other forms of communication in order to further its twin goals of collaboration and dissemination. Social media is used to disseminate interdisciplinary research results, share events and also to foster new collaborative projects by promoting new ideas and sharing member interests. By providing a single online presence for many different departments and research areas, STEAM Factory's communication naturally weaves together multiple research strands and prompts those viewing STEAM Factory updates to think in new and creative ways.

The STEAM Factory also works closely with many outreach partners to amplify STEAM programming and events. External outreach partners include WCBE (90.5FM), Greater Columbus Arts Council, 400 West Rich, and Columbus Idea Foundry. The Ohio State University outreach partners include: The Office of Outreach and Engagement, Office of Research, ASC Communications, Buckeye Leadership Fellows Program and the Lantern. You can view a list of our sponsors and affiliates at https://steamfactory.OhioState.edu/sponsors-and-affiliates-2.

Community Engagement and Partner Events

The STEAM Factory engages regularly with a diverse group of community partners on events and other projects to both strengthen the Franklinton community and give members more opportunities to engage members of the public with research in dozens of varied disciplines. These activities have included public roundtable discussions, multi-week workshops designed to help artists develop practical business plans, monthly meetings for the City of Columbus Green Team, Friends of the MetroParks Board meetings, and many others.

Outreach Events and Activities

Access to special outreach events, seminars and workshops allow for the sharing of cutting edge research, projects and programs of STEAM faculty member research to a public that might not otherwise access it.

CHAPTER 6:
STUDENT ENGAGEMENT

STEAM STUDENT PROGRAMS

Undergraduate and graduate students working with members of The STEAM Factory benefit from having access to faculty mentors that represent an extensive array of disciplines, and having opportunities to practice conveying their work to a broader public audience while simultaneously developing real-world experience and skills outside the traditional classrooms. Additionally, students involved with STEAM faculty are also given the opportunity to work closely with STEAM University and community partners. STEAM Factory proposed student programs include the following:

- **Jacob Mitchell Landscape Architecture Class (Picturing Site: Producing Meaning Through Survey and Representation) – January 11, 2017**

  STEAM hosted Jacob Mitchell's advanced elective seminar as they focused their course research on the Broad Street corridor located within East and West Franklinton, Downtown and the Near East Side. Students were given information about the historical development of the Franklinton neighborhood as well as information about the current transformation and revitalization underway within the community.

- **Jennifer Schlueter Research Methods Class – November 7, 14, 21, 28 & December 5, 2016**
  STEAM hosted Jennifer's upper level research methods class for multiple meetings and discussions.

- **Susan Melsop Design Research Class capstone class Autumn Semester- 2016 and 2017**
  STEAM partnered with Susan twice to host her annual design capstone seniors as they spend/spent a semester conducting research and developing a program to support and enhance the quality of life of residents (current and incoming) business establishments and visitors in Franklinton. During this course, students are challenged to understand issues of development, gentrification, and plan for inclusive community "place-making." Susan's course focuses/focused on the redevelopment and design of four iconic Franklinton buildings including: 1) Kessler Grocery Store (Town St), 2) The Church (on McDowell), 3) Fire House No. 6, and 4) Fire House No. 10.

- **SUSAN MELSOP DESIGN Spring Semester - "Advanced Interior Studio Design" Design Research Class - January 2017 and anticipate 2018**
  STEAM partnered with Susan to host her design seniors as they developed the concept, brand and interior spaces for the program they developed during the autumn. Along with floor plans for a new program, students design a short video and a comprehensive research analysis booklet that documents their "decision-making" process. STEAM showcased the students final projects and poster sessions in which students could share their research and design with members of the Franklinton community during the April 2017 Franklinton Friday Open House at The STEAM Factory. https://steamfactory.osu.edu/events/april-franklinton-friday-0 A similar partnership for a student showcase is anticipated for the April 2018 Franklinton Friday Open House at the STEAM Factory.

- **Enrico Bonello Lab Meetings – August 31, September 28, October 12, November 9 and 30, December 14, 2016**
  STEAM hosted Enrico's research lab class for multiple meetings and discussions.

- **Katie Walton's Research Group Retreat - February 21, 2016**
  STEAM Factory hosted STEAM Member Katie Walton's Research group retreat. The workshop provided training on how to implement Reciprocal Imitation Training, and evidence-based early intervention for children with autism spectrum disorders. This workshop trained seven new student providers in preparation for an upcoming research project comparing the effects of therapist-implemented versus parent-implemented Reciprocal Imitation Training.

- **Zakee Sabree's Lab Group Mini-Retreat - Sunday, February 21, 2016**
  The Insect-Microbe Symbiosis Lab (IMSL) is seeking to hold its biannual planning meeting at the STEAM Factory space. In this meeting, the group set funding, publication and occupational goals for the next 6-12 months, reviewed past progress, and developed ongoing strategies.

- **Buckeye Leadership Fellow Challenge September 8 - October 20, 2015**
  Development of a STEAM Factory/Buckeye Leadership Fellows Program (BLF) pilot leadership challenge program in which an interdisciplinary group of STEAM Factory faculty worked closely with BLF student scholars through a six-week real world challenge. The challenge of creating a project management system in the new STEAM Space was given to a group of Ohio State students. Four teams presented and a winner was selected. The STEAM Factory hired four undergraduate students from the BLF challenge to work on a variety of projects. This resulted in the Ideation board, a station in the STEAM Space that allows members to pose collaboration ideas.

- **STEAM Factory Professional Writing Minor Student Internships**
  The development of a variety of interdisciplinary STEAM Factory student internships and fellowships that partner with existing university student and scholar programs. The STEAM Factory worked closely with numerous student interns from the Professional Writing minor program. Professional Writing minor student interns have included: Alexa Cohen (Class of 2018, Marketing), Brooke Little (Class of 2017, English), Chrissy Foltz (Class of 2017, Marketing) Leah Franklin (Class of 2016, Strategic Communications), Brittany Law (Class of 2018, Psychology and Women's Gender and Sexuality Studies) and Taryn Stanley (Class of 2017, Strategic Communications and Consumer Science).

- **Dr. Leslie Fine (Associate Professor of Marketing, Fisher College of Business) on her senior capstone Project-Based Marketing Course (BUSML 4204: MARKETING PROJECTS**
  The development of partnerships with departmental capstone classes to create opportunities for interdisciplinary senior capstone projects. During the Fall 2015, the STEAM Factory worked closely with Dr. Leslie Fine (Associate Professor of Marketing, Fisher College of Business) on her senior capstone Project-Based Marketing Course (BUSML 4204: MARKETING PROJECTS - Client STEAM Factory). The STEAM Factory met repeatedly with 45 students in the course broken up into seven teams. Project-Based Marketing Consulting (BUSML 4204: Marketing Projects) is an action-based learning experience as well as a competition. Students worked within their teams on STEAM marketing needs and developed the following deliverables:
    - A comprehensive marketing implementation plan and presentation
    - A fully developed set of collateral marketing materials which included print materials, website sample pages; sample social media posts and outreach materials.
    - Research insights, findings and other analyses that supported team recommendations.

- **Dr. Shoshanah Goldberg-Miller and ARTEDUC 5673 - Symposium Issues**
  The STEAM Factory worked closely with Shoshanah Goldberg-Miller's class on Symposium Issues. The course explores new ideas or changing arts policy issues through readings and visiting experts to prepare students for participation in biennial Barnett symposium. STEAM met with the entire class on repeated occasions to offer insights into guerilla marketing and social media ideas, development and fundraising and event planning and implementation. The STEAM Factory also worked closely with the class for participation in its April 2016 Franklinton Friday Open House. The class developed multiple interactive demonstrations and activities for the general public that focused on both the Barnett Symposium Outreach as well as varying definitions and conceptions of creativity.

- **Dr. Mattijs van Maasakkers and CRPLAN 3300 - Planning for and with People**
  The STEAM Factory worked with Tijs for his course on urban agriculture. The students developed public engagement processes for with Matt Barnes of RootsUp (a local company focused on

deploying innovative urban agriculture models) for a Franklinton neighborhood project utilizing an abandoned lot. The STEAM factory was an appropriate space because of its location, but also because it gave the students a real-life example of the redevelopment of existing buildings. A group of Ohio State students and faculty met to collaborate, discuss and propose solutions to promote the city of Columbus' new agenda to connect neighborhoods. Engagement occurred with a world-class urban planning initiative, helping Ohio State faculty test and simulate tools for urban land redevelopment with an overall goal to learn how to build better neighborhoods. All of the Forge collaborations, from Kiva to #ForgeAhead, promote stronger neighborhoods.

- **Tijs van Maasakkers' Pilot test run of OH/Lex - Urban Planning Initiative @ The STEAM Factory 400 W Rich – March 8th, 2016**

  The STEAM Factory worked with Tijs to offer a test run of a public engagement tool he is developing for his research and work in Lima, Ohio, funded under the Outreach and Engagement Impact grant. A similar negotiation simulation was developed around vacant land reuse in New Orleans and Tijs needed to beta test the tool with some professionals before using it at a public event in Lima (which they utilized in June 2016). The STEAM Factory provided use of the collaboration and co-working space that provided easy for its professional stakeholders and encouraged people to consider alternative possibilities for land reuse.

STEAM FACTORY STUDENT INTERNSHIP PROGRAM

The STEAM Factory has worked closely with undergraduate and graduate student interns from the Ohio State University as well as other universities nationally. STEAM Factory interns receive regular professional development experience in a variety of settings within a diverse group of disciplines. STEAM interns also gain valuable experience assisting in the development, planning and implementation of marketing, programming, development efforts and event coordination. STEAM interns regularly assist the STEAM Factory with planning and implementation of events both on and off of the Ohio State campus and have a variety of outreach opportunities with faculty, staff, students, business and industry partners as well as members of the general public. STEAM interns also assist in a wide variety of writing projects, including grant writing and reporting, the development of news and outreach stories, efforts for gathering, organizing and synthesizing data, statistics and information for future programming, planning and event development.

- Faryn Ash, Programming Intern (Class of 2017, Mathematics)
- Brooke Little, Programming Intern (Class of 2017, English, Professional Writing)
- Xiaohan Huo, Programming Intern (Class of 2018, Accounting, Economics)
- Sara Stacy, Programming Intern (Class of 2018, Journalism)
- Mara Mason, Programming Intern, (Class of 2019, Journalism)
- Jake Rahe, Programming Intern (Class of 2018, Journalism)
- Alexa Cohen, Professional Writing Intern, (Class of 2018, Marketing)
- Madeline Nicol, Programming Intern, (Class of 2018, Psychology)

PREVIOUS STEAM FACTORY STUDENT INTERNS

- Erika Vocke, Marketing Intern (Class of 2016, Strategic Communications)
- Chrissy Foltz, Programming Intern (Class of 2017, Marketing)
- Jesse Crawford, Programming Intern (Class of 2016, Masters in Arts, Administration, Education & Policy)
- Avni Bapat, Programming Intern (Class of 2016, Neuroscience & Psychology)
- Taryn Stanley, Professional Writing Intern
- Annabelle Sudue, Professional Writing Intern (Class of 2017, Fashion and Retail Studies)
- Austin Channell, Summer Visiting Intern (Class of 2018, Engineering, Vanderbilt University)

- Denise Costin, Summer Visiting Intern – (Class of 2018, Mathematics and Computer Science, The University of Chicago)
- Leah Franklin, Professional Writing Intern (Class of 2016, Strategic Communications)
- Caroline Milliken – Buckeye Leadership Fellow Intern (Class of 2016, Strategic Communications and English)
- Theodor Coman - Buckeye Leadership Fellow Intern (Class of 2019, Finance)
- Haiyan Cheng - Buckeye Leadership Fellow Intern (Class of 2016, Accounting)
- Emily Liptow – STEAM Factory Intern (Class of 2015, Industrial Engineering)
- Emily Erossy – Professional Writing Intern (Class of 2015, English)
- Emily Norris – Professional Writing Intern (Class of 2015, French)

CHAPTER 7:
OUTCOMES, IMPACTS, AND PLANS

BALANCED SCORECARD

Sathya Gopalakrishnan (Assistant Professor, Agriculture, Environmental & Developmental Economics), The STEAM Factory Director of Evaluation and Metrics and Julie Carpenter-Hubin (Director, Institutional Research and Planning, Office of Academic Affairs), with input from the Evaluation & Metrics Working Group, have developed a balanced scorecard to aid the STEAM Factory in aligning its programs and activities with its mission of facilitating collaborative teaching, research and outreach. Below is the STEAM Factory Balanced Scorecard covering the dates from January 2013 (unofficial founding of the STEAM Factory) to Present.

The STEAM Factory 2015-2017 Balanced Scorecard

Outreach and Engagement			
Objectives	**Measures**	**Status: June 2016**	**Status: June 2017**
Expand outreach & engagement	Outreach events	80+	180+
	No. of people reached	10,000+	15,000+
	No. of Columbus outreach partners	14	20
	No of university, government and community events sponsored with STEAM Factory space use	***(statistics unavailable)	120+ events with $35,000 in space sponsorships
	Attendance at STEAM space sponsored events	***(statistics unavailable)	3,600+
Objectives	**Measures**	**Status: June 2016**	**Status: June 2017**
Enhance Teaching & Learning	No. of graduate students trained with interdisciplinary mentorship	2	13
	No. of graduate & undergraduate students who presented at outreach events	80+	130+
	No. of undergraduate students involved in research projects	16	58

Enhance Reputation & Visibility	Recognition received by STEAM Factory members for research, teaching and/or outreach	13	49
Establish Strategic Partners	Relationships developed	30+	50+

Research Grants			
Objectives	**Measures**	**Status: June 2016**	**Status: June 2017**
Secure Competitive Grants	Proposal volume	48 Grants Submitted	66 Grants submitted
	Dollars raised with STEAM Factory support for broader impact	$5.6 Million	$9.3Million

Objectives	**Measures**	**Status: June 2016**	**Status: June 2017**
Research & Innovation	Ongoing; Completed STEAM supported member research projects	17	38
Demonstrate leadership	No. of members with NSF Early career awards	8	12
	No. of members with recent significant research awards	21	29
Objectives	**Measures**	**Status: June 2016**	**Status: June 2017**
Recruit superior talent	STEAM Factory Membership Statistics	107 Active Members	150 Active Members
Achieve diversity	Membership by departments, colleges, and centers	69 departments, 18 colleges & centers	82 departments, 38 colleges & centers
	Membership by Gender, Underrepresented population	42% women; 26.1% Underrepresented	50% women; 21,3% Underrepresented

Facilitate collaborations	Research, teaching and outreach collaborations	***	50+ collaborations created including 35 Research, 15 Teaching and 20 Outreach
Engage existing faculty in productive collaboration	No. of cross disciplinary faculty research contact hours; disciplinary diversity in STEAM Exchange participation	2000+ research service hours, 60+ disciplines for attendees, 27 disciplines for presenters	3000+ research service hours, 73 disciplines for attendees, 51 disciplines for presenters
Engage existing faculty in productive collaboration	Total STEAM Powered Project seed grants awarded	Six awards totaling $35,200 to 16 members representing 15 disciplines	13 awards totaling $81,693 to 29 members representing 22 disciplines
Engage existing faculty in productive collaboration	Qualitative impact	Quotes under separate cover	Quotes under separate cover

OUTCOMES AND IMPACTS

- Establishment of an integral Ohio State presence – seminars, lectures, workshops and outreach activity – in the Franklinton community
- Establishment of a regular presence by representatives of The STEAM Factory and student interns in Franklinton and regular seminars, lectures and workshops within larger STEAM space
- Establishment of 30+ new community, business and industry partnerships and strengthening of existing key partnerships
- Sharing of skill sets and experiences across members of The STEAM Factory to enhance research, teaching and outreach methods
- Establishment of the STEAM Factory as a Columbus portal into the diverse array of Ohio State research and resources
- Increased awareness of Ohio State research activities in the wider community through activities at the STEAM Factory collaboration and co-working space in 400 West Rich and the Franklinton neighborhood

- Development of new materials and methods for visualizing research and creating interactive displays for engaging with both academic and non-academic audiences
- Identification of innovative interdisciplinary research, teaching and outreach opportunities
- Provision of a forum for regular interaction and discussion across academic disciplines
- **Important Numbers for Outcomes and Impacts:**
  - Most diverse faculty network at Ohio State featuring 150 members, representing 82 Departments and 38 Colleges / Institutes
  - Hosted 29 STEAM Exchange Colloquia
  - Engaged 3000+ Hours of faculty interaction in STEAM Factory collaborative research activities

- 66 Research proposals submitted by STEAM Factory members with STEAM Factory letters of support
- 38 ongoing STEAM member collaborations
- Over $9 million in research grants secured by STEAM members with STEAM Factory letters of support
- 13 STEAM Powered Project Seed Grants awarded involving 29 STEAM faculty members and 22 disciplines
- Hosted and participating in over 180 outreach events featuring over 75 faculty presenters and representing over 35 research disciplines
- Over 15,000 Columbus community members reached
- Over 130 undergraduate and graduate students presenters involved at STEAM outreach activities

Peer validation and evaluation of projects will be based on both internal and external feedback. All of these evaluation metrics could potentially be used as evidence for success of The STEAM Factory in applications for additional funding sources. Internal feedback will be generated by The STEAM Factory Board of Directors and The STEAM Factory Evaluation and Metrics working group. Items for internal discussion will include the appropriate use of program funds, opportunities for cost recovery and fiscal sustainability via grants and external funding; success of current STEAM Factory program activities toward the group's stated goals and objectives; activity inclusiveness for all targeted audiences for regular review and evaluation.

The results of these discussions will be used to refine the project activities in consultation with the university and community partners as appropriate. Additionally, an annual internal report will be generated to provide feedback on the progress and growth of the group, the activities undertaken over the preceding year as well as financial data. A copy of the report will be provided annually for ongoing stakeholder feedback to community partners and Ohio State funding sources.

MEMBER PERCEPTIONS AND VALUE OF THE STEAM FACTORY – A STEAM FACTORY SURVEY – AUTUMN 2017

The STEAM Factory designed a membership survey that was taken in Autumn 2017 with a nearly 80% participation rate. The following responses reflect those survey results including the word cloud below in which members were asked to describe the STEAM Factory in one word.

Additional survey data include the following:

- 72% of STEAM members have attended at least one STEAM Exchange
- 30% of STEAM members have presented at a STEAM Exchange
- 74% of STEAM members have attended a STEAM Factory outreach event
- 58% of STEAM members have presented at a STEAM outreach event
- 55% of STEAM members have used the co-working space
- 55% of STEAM members have been a PI, Co-PI, Senior Personnel or Doctoral Researcher on a funded proposal in the past year.
- 20% of STEAM members have received STEAM Factory letter(s) of collaboration – from Master Panel
- 46% of STEAM members reported having completed or ongoing collaborations with other STEAM members
- 29% of STEAM members have developed grant proposals with STEAM collaborations

The above word cloud reflects the disciplines of STEAM Factory member responses from the Autumn 2017 membership survey.

QUALITATIVE IMPACT

"At a big university like Ohio State, it can be hard to learn what's going on and to get involved in projects outside your department or discipline. The STEAM Factory has enabled me to meet faculty and make connections across the college and university. It has provided not only a place to work and meet, but also a real sense of intellectual community, where I can exchange ideas with colleagues from diverse disciplines. STEAM Factory events have been the most lively and engaging that I've found at Ohio State. "

-Sam White (Assistant Professor, History)

"STEAM Factory has been an incredible resource in finding and creating connections to faculty from other departments. I would've never been able to get some projects started without these connections. Additionally, the space at 400 W Rich creates an ideal venue for outreach and community engagement - two things that I am very passionate about."

-Paul Sutter (Astrophysicist, Department of Astronomy, and Chief Scientist at COSI)

"I am getting (and seeking to get) exposure to people and ideas from other parts of campus that I wouldn't normally encounter. The STEAM Factory facilitates that very well, in at least two ways. There's the intellectual curiosity and coolness of being exposed to what others are doing, and there's the social network aspect of it that greases the wheels for collaborations/partnerships on proposals/projects and such. For example, I would have never known about the Dust Library and all of the neat stuff to think about with dust. Also, I've submitted proposals that require multi-disciplinary teams, and I would have had to find, introduce myself, and navigate a relationship with a potential co-PI, when the opportunity presented itself if it weren't for STEAM Factory. With STEAM Factory, I can email Arnab and say "Hey, there's this opportunity... are you game to go in on it with me?" for example. We already have a sense of (a) what each other does, and (b) each other. (Both the professional and the personal are important!) In a related aspect, I had dinner on Monday with Sathya and Sivakoff and a DT hire candidate. I think that it would have been a little more difficult for Sathya (on the search committee) to find relevant and interesting people across campus to join for dinner (in part as a recruitment strategy). I think this sort of thing will be increasingly important as the university pursues more DT hires and more joint hires.

I also appreciate all of the "infrastructure" that STEAM Factory has in place / is putting in place for

outreach and community engagement. I haven't yet been too engaged with that, but it is helpful to know and be able to get involved with it.

-Jeff Bielicki (Assistant Professor, Department of Civil, Environmental, and Geodetic Engineering and the John Glenn School of Public Affairs)

"When I was offered a tenure-track position in the Knowlton School at Ohio State I had been to Columbus exactly once, namely for my job talk. My partner had never been here. Having lived in Boston together for the previous 8 years, where both of us went to MIT for graduate school, we did not know much about Columbus or Ohio State University. One of the things we both loved about the community we were a part of in Boston was that it was diverse, oriented towards creating societal impact and open to new ideas. While my partner is not an academic, she is in the same field as I am, urban and regional planning, which means our professional networks generally overlap. I received another tenure track offer right after the one from and this would have allowed us to stay in Boston. On our recruitment visit, I asked if we could visit 400 W. Rich, since one of the faculty members in the Knowlton School told me about the STEAM factory and the development of a dedicated space there. On a freezing February morning, we were shown the space in 400 W. Rich, back then still very much under construction. Not only did Roman show up, but several other folks from the STEAM factory and 400 W. Rich were there to talk to us about faculty life in Columbus. Not only did this give us a sense of possibility, it also communicated that Ohio State, institutionally, supports the kind of diverse, action-oriented and open networks that we are passionate about. We still love Boston and all it has to offer, but seeing the STEAM factory and interacting with some of its members, even briefly, allowed us to imagine a life in Columbus that simply walking around campus never could have achieved."

-Mattijs van Maasakkers (Assistant Professor, City and Regional Planning)

"The STEAM Factory has contributed in so many ways to my first couple years as an assistant professor at OSU. The STEAM Exchanges were an exciting source of new knowledge and inspiration from outside of my discipline. I frequently used the STEAM space for work, and met many other young professors and potential collaborators just by working alongside them in this space. STEAM outreach events have put me in contact with community groups doing relevant and important work. Overall, the STEAM Factory was a starting point for building community here in Columbus — in fact, for building two overlapping communities, a community of friends and a community of collaborators."

-Leah Bevis (Assistant Professor, Agriculture, Environmental, and Development Economics)

"As a junior faculty at this huge university, STEAM factory is such a unique place for me to discover available resources, learn about other peoples' research interests, and find creative inspirations.

– Yvette Shen (Assistant Professor, Design)

"We wanted OSU art students to be better prepared for the art world as entrepreneurs. So we created a program that brought art students and working artists in the community through a series called ARTrepreneur Workshop Series. If it weren't the excellent partnership we have with the STEAM Factory, we would not have had the space to facilitate the workshop series, a venue that is easily accessible to both students and the community, or the ideal place where art and business can come together for everyone's success."

– Melissa Crum (ARTrepreneur Specialist, Founder and Principal Consultant at Mosaic Education Network)

"I joined the STEAM Factory as a brand new professor with few contacts in the Columbus area. The STEAM factory helped me to immediately create a network of innovative and passionate thinkers and also provide a space and events to interact with them. I am learning how rare it is to hear and learn about your own colleagues' work, but through the STEAM Factory events, I know so much about all the amazing work that other STEAM Factory members do. And most of all, the STEAM Factory has helped me see that there are multiple paths of professorship, I don't just have to focus at what happens in my own discipline because that's the way it's always been done."

– Teddy Chao (Assistant Professor, Math Education)

"I have benefitted from my connection with STEAM in three ways, primarily. First, it has allowed me to share my work with other STEAM members and with the broader community through presenting at the Franklin Town Fridays event. Second, I have been able to utilize the STEAM space to collaborate with fellow STEAM members on the development of collaborative project ideas. Third, even though I was not ultimately awarded a STEAM micro-grant, putting it together in connection with other STEAM members and with STEAM Factory organizers has allowed me to hone new project ideas and begin to plan how to unfold the project in collaboration with the STEAM Factory."

– Maurice Stevens (Associate Professor, Comparative Studies)

The STEAM Factory has been an integral part of my continued excitement about OSU since I arrived 3 years ago. In particular, thanks to STEAM Exchanges, I have forged new friends and collaborations with people across campus, and I always look forward to how the next Exchange will inspire me to see the world in yet another fascinating way. The space at 400 W. Rich St is such a gem as well, allowing me to further engage with local community residents and artists, host meetings with collaborators, and accomplish some of my own research tasks in a welcoming environment. And a huge thanks to Charlene Brenner for her tireless efforts to keep us all focused on the next intellectual adventure!

– Alia Dietsch (Assistant Professor, Environment and Natural Resources)

". . . I've benefitted in lots of ways by being part of STEAM. Some of the benefits have been super tangible, for instance the fact that I received a small STEAM grant (with Katherine O'Brian) to help develop ideas for doing outreach activities connected to COSI's new dinosaur exhibit. Another very tangible benefit was getting to use the space over the summer for our NSF REU program. The STEAM space was a complete and total success for us, and really added to the warmth and friendliness of the program. Other benefits have been less tangible but still very real to me. I have loved the exchanges where I get to hear from people from all over campus. It is wonderful to feel like I'm part of this large, diverse, and vibrant community."

– Laura Wagner (Associate Professor, Psychology)

"For me, STEAM has facilitated connections with other researchers who are studying similar phenomena, but from entirely different disciplinary perspectives. I've been at OSU for less than a year and already these STEAM-powered connections have led to several grant proposals."

– Nicole Sintov (Assistant Professor, Behavior, Decision-Making, and Sustainability)

"For me, STEAM factory operates "horizontally" as opposed to the "vertical" orientation of department, so through STEAM, I manage to make connections to people I wouldn't normally meet -- but who can often assist in key ways in my projects. That means making research connections between math and materials science, learning more about NoSQL databases for my education websites, and improving my outreach skills."

– Jim Fowler (Assistant Professor, Mathematics and Director, The STEAM Factory

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"The STEAM Factory has been one of those unexpected positives of being here at Ohio State University. Professionally, it has provided the opportunity to collaborate with other researchers that I probably would not have met; allowed me to share my work and research interests with others, and created a space for camaraderie and community. Personally, I've made new friends which is important when you move to a new city with no roots."

– Kareem Usher (Assistant Professor, City and Regional Planning)

"Being involved in STEAM gave me a place for my outreach work. Through the farmer's markets and now Franklinton Fridays, I could present about my research without all the overhead of finding a location and audience myself (and this effort is easy to discuss on NSF proposals). Also, STEAM helped me form a network of colleagues that I think of as potential research collaborators and as mentors/peers that I can ask for both personal and professional advice."

– Lisa Hall (Assistant Professor, Chemical & Biomolecular Engineering)

"I find the STEAM Factory community invaluable for generating and refining research ideas. These are the scholars I trust when I need a consult in the early stages of research, especially when a project takes me beyond my specialization. STEAM colleagues have supported good ideas by directing me to resources I did not know I needed, and gently steered me out of skids when I have wandered beyond the pale."

– Mark Rudoff (Associate Professor, Orchestral Instruments)

"The STEAM Factory has connected me with a number of potential collaborators and new friends. Working at COSI and running a summer program there, the STEAM Factory space has been invaluable, allowing us to keep the teaching and working spaces close together. I love having such an exciting program available to us, especially to new faculty."

– Kathryn Campbell-Kibler (Associate Professor, Linguistics)

"The STEAM Factory has provided me with a continued venue for sharing my research with the public at large. I believe that including the public in our research is invaluable, for it is the public who make this research possible. Without the STEAM Factory, I do not believe that any other such outlet would exist."

– Bart Snapp (Auxiliary Assistant Professor, Mathematics)

"STEAM has served as a great grounding force for me — it has undoubtedly helped me understand that the challenges that I am faced in my silo are really no different than ones in other fields."

– Jim Chen (Assistant Professor, Biomedical Informatics and Internal Medicine, Division of Medical Oncology)

"Joining STEAM reminded me why I wanted to pursue a career in academia in the first place. When your daily work becomes business as usual and you get pigeonholed, it is nice to be reminded that there is a big world out there and there are still people who believe they can make it a better one. I am also looking forward to future interdisciplinary collaboration projects through STEAM."

– Amer Rafat (Assistant Professor, Dentistry Division of General Practice and Materials Science)

BROADER IMPACTS OF STEAM FACTORY ACTIVITIES

The STEAM Factory has engaged in a diverse range of outreach activities and participated in over 80 events reaching over 10,000 members of the greater Columbus community. The STEAM Factory's diverse outreach activities have engaged both tenured and junior faculty, graduate and undergraduate students in outreach opportunities. The outreach potential and impact of these activities have been strongly recognized by funding agencies such as the National Science Foundation (NSF). Below is a small sample of these anonymized STEAM member NSF reviewer comments as to the benefits of STEAM programming on the broader impacts of faculty research:

- "The PI has been a leader in the STEAM factory, which provides a unique impact on the community... There is a focus is on bringing underrepresented groups in to the facility, and (the outreach activity) has been demonstrated in STEAM."
- "The STEAM factory was viewed very positively in the discussion. This effort is outstanding. These efforts to interact with the community and the world at large are impressive. (The PI) also has a strong plan for broader impact via the STEAM initiative."
- The PI is creatively coupling to existing programs at Ohio State. . . for education and outreach. (The Pi's) plans there are exciting."
- "Strengths: STEAM is a unique program for public awareness and outreach activities of the proposed research. The STEAM program for community outreach is good. The PI has outreach activities to incorporate deprived neighborhoods in Columbus, OH. A CoPI has interactive displays, which act as educational tools."
- (The PI has a) strong plan for broader impact via the STEAM initiative.
- STEAM is a unique program for public awareness and outreach activities of the proposed research.

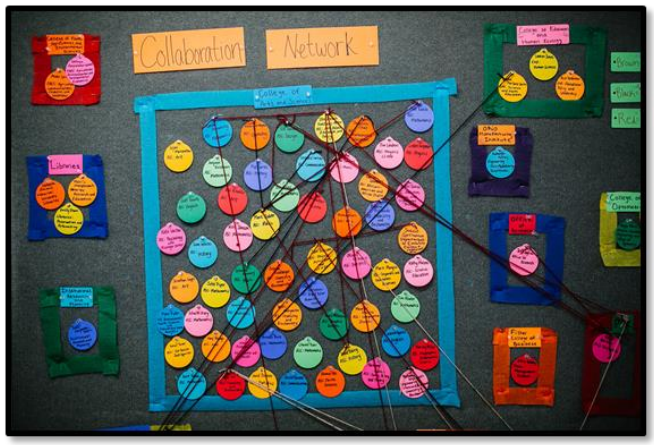
MEMBER PERCEPTIONS AND VALUE OF THE STEAM FACTORY – A GROUNDED THEORY APPROACH – 2015 TO 2016

The STEAM Factory Evaluation & Metrics Working Group was tasked with developing metrics to measure the success of the STEAM Factory. Initially, the Evaluation and Metrics working group found designing metrics that captured both the quantitative and qualitative impacts rather challenging. The working group decided to move forward with a foundational "ground-up" approach to designing appropriate measures to determine the STEAM Factory's success. During the summer 0f 2015, the STEAM Factory hosted four small facilitated focus group discussions featuring four questions related members interests, benefits and conflicts related to their STEAM Factory membership. There was approximately a 25% participation rate by STEAM membership for the focus group discussions. Each focus group was facilitated, audio-recorded and transcribed and the transcripts were comprehensively mined for common themes and unique ideas.

The following themes emerged from the grounded theory approach to be the primary interests of STEAM Factory members through their membership participation:

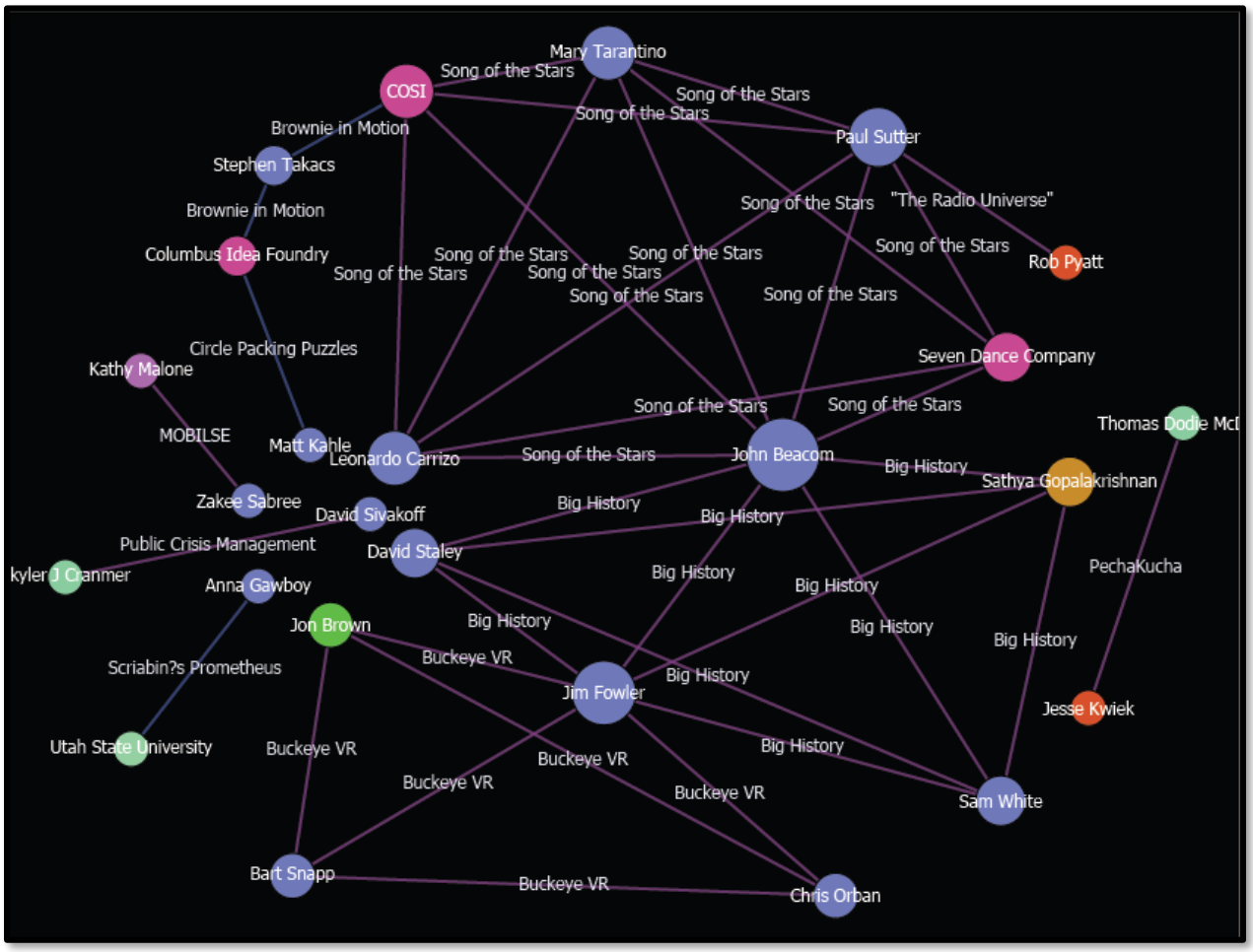
1. Networking opportunities,
2. Opportunities for recognition of member efforts via STEAM Factory communication channels,
3. Opportunities for membership communication,
4. Desire to participate in STEAM Factory events, and
5. Opportunities for career development.

The above-mentioned themes established the foundation as to what items STEAM would measure to evaluate STEAM Factory's success. Following the completion of the grounded theory evaluation efforts, the STEAM Factory developed a beta version of STEAM Factory "Collaboration Network" board. The Collaboration Network tool was developed in January 2016 on a large 6' by 6' bulletin board in preparation for the STEAM Factory Collaboration Cauldron. Each STEAM Factory member's name was included within their own college or office. Members were encouraged to interact with the tool by using designated colors of yarn to differentiate collaborations in research, teaching and



outreach. Over 35 members (of nearly 85 existing members) interacted with beta tool. STEAM student interns then recorded all of the above mentioned collaborations and recorded 57 collaborations among STEAM members. The STEAM Factory followed up with all STEAM collaborators for additional details on identified collaborations.

In effort to better gauge the extent of STEAM collaborations, the STEAM Factory conducted short member interviews during the Spring 2016 semester. The response rate for this effort was 36% of STEAM Factory members. Questions focused on information on the extent of member collaborations derived from STEAM Factory participation. Member responses were recorded and STEAM Collaboration Network visualizations were developed. Below is one visual representation of STEAM Factory member collaborations.



CHAPTER 8:
BUDGET

ANNUAL OPERATING BUDGET

Budget Summary

The STEAM Factory FY 2016-17 expenses totaled $229,550.24 including $48,000 in funding for STEAM-Powered Projects and an outstanding invoice of $4,645.31 for the May 2015 STEAM Factory symposium. The first column includes the budget category and details of these expenses are described in the budget justification below.

STEAM ACTUAL FY 2016-17 ANNUAL OPERATING EXPENSES		
Personnel Salary/Benefits		
Project Coordinator		$74,304.68
Operations Manager		$13,753.88
Consulting for Photography/Video		$6,336.00
Student Employees		$18,651.93
Personnel Salary/Benefits		**$113,046.49**
Rent/Utilities - 400 West Rich Street		
Leasing fee		$434.40
400 West Rich Large Space Rent		$43,512.32
Rent		$43,946.72
Ongoing Program Expenses		
STEAM Powered Projects		$48,000.00
Conferences/Workshops	***May 2015 Symposium***	$6,082.06
STEAMx, Franklinton Friday & Member Events		$11,254.31
Program Expenses		$65,336.37
Additional Operating Expenses		
Equipment/Electronics/Software		$2,441.20
Office materials & supplies		$662.44
Promotional/printed materials		$1,089.21
Transportation		$240.00
Miscellaneous		$2,787.81
Additional Operating Expenses		$7,220.66
Total Actual FY 2015-16 STEAM Expenses		$229,550.24

The STEAM Factory FY 2016-17 expenses totaled $229,550.24 including $48,000 in funding for STEAM-Powered Projects and an outstanding invoice of $4,645.31 for the May 2015 STEAM Factory symposium. The first column includes the budget category and details of these expenses are described in the budget justification below.

Budget Justification:

- *Personnel Salary/Benefits.* A total of $113,046.49.34 was spent on personnel salary and benefits during the FY 2016-17 period. Personnel salary and benefit expenses included payroll expenses for Charlene Brenner, full-time project coordinator, and John Pieper, part-time Operations Manager. Additional expenses include hourly salaries and benefits for a part-time employee and student interns. A small portion of the personnel salary and benefits was spent on independent consultant photographers and videographers who took both photographs and videos during evening and weekend STEAM Factory events for the design and production of marketing materials, including flyers, publicity articles, and use on the website and social media.

- *Rent/Utilities - 400 West Rich Street.* A total of $ 43,946.72 was spent on rent and utility expenses for an approximately 3,600 square foot space in the 400 West Rich building, in the East Franklinton Creative Arts District during the FY 2016-17 period. Facilities at 400 West Rich provide an opportunity for STEAM members to use the collaboration and co-working space. The STEAM Factory space also saw an intensive increase in its amount of use by both STEAM Factory members, units within Ohio State (including The Discovery Themes, the College of Engineering, College of Arts and Sciences, Translational Data Analytics Institute, and many others) and business/industry and community partners. The STEAM Factory received rental income of $7,900 for rental of its space and provided space rental sponsorships for $35,000. The STEAM space provides an unrivalled opportunity to conduct outreach and directly engage with the Columbus community (e.g. Franklinton Friday Open Houses) in an informal environment. It is more accessible than the Ohio State campus for engaging with artists and a public audience that would otherwise be difficult to reach. It hosts a variety of public events, informal lectures and educational groups.

- *Program Expenses.* A total of $ 65,336.37 was spent on ongoing program expenses during the FY 2016-17 period. Ongoing program expenses included $48,000 in expenses for the STEAM Powered Projects micro-seed grant program. This was designed to support STEAM member collaborations by providing small amounts of funding for research, teaching and outreach collaborations that are difficult to fund through traditional methods. Program expenses also included an unpaid invoice in the amount of $4,645.31 associated with the May 2016 STEAM Factory symposium. Ongoing program expenses also included disposable materials, food and catering costs to support a wide variety of public outreach events, faculty interdisciplinary seminars, colloquia and intermittent special membership events.

- *Operating Expenses.* A total of $7,220.66 was spent on additional operating expenses during the FY 2016-17 period. Additional operating expenses included the purchase of small equipment and electronics including a laptop computer and audio/visual equipment. Funds were spent on office materials/supplies as well as the production and development of marketing materials, including flyers, portable signs, publicity articles and equipment and required for the variety of workshops, seminars and public outreach events.

SUSTAINIBILITY

The STEAM Factory will work closely with existing and new university, community and industry partners while constantly identifying possible areas of reciprocal benefits, including funding possibilities from a variety of sources. In the past year, The STEAM Factory has continued to modify and utilize its initial space rental policy to encourage space use by organizations both internal and external to the Ohio State University community. The STEAM Factory secured nearly $8,000 in space rental income and has seen a dramatic increase in the daily space use by membership while making the space for additional rental and sponsorship possibilities spanning a wide range of educational topics. The STEAM Factory also simultaneously continues to prioritize the main use of the space as a collaboration and co-working facility for members as well as a venue for a variety of academic seminars, workshops and educational opportunities that benefit the Ohio State community including faculty, staff, administrators, undergraduate and graduate students as well as community partners, business and industry partners and members of the Columbus community.

Additionally, the STEAM Factory will continue to establish itself as a resource for Ohio State faculty to showcase the broader impacts of their research and to provide a forum for holding public seminars, lectures and the like. These activities have successfully provided opportunities for junior faculty at Ohio State to demonstrate a broader community impact for their research, as evidenced by the eight NSF Early CAREER awards to STEAM members in the past few years, even as these outreach activities are often not rewarded within respective departments. Since July 2015, the STEAM Factory has provided seventeen (17) grant proposal letters in support of broader impact activities through the STEAM Factory programming and space.

Additionally, in the past year, the STEAM Factory has begun to request a small budget allocation to support participation in developing and hosting these outreach activities. Successful grant proposals have secured nearly $5,000 for STEAM broader impact activities, with an additional $24,000 requested for outstanding proposals awaiting decisions. Future proposals arising from The STEAM Factory's activities are intended to incorporate small amounts of funding as part of their research budge, benefiting the individual members of The STEAM Factory and Ohio State in general. Finally, the STEAM Factory continues to seek external funding opportunities appropriate for collaborative research, outreach and engagement to provide financial sustainability and support. The STEAM Factory will also work closely with its Ohio State University and external partners to identify additional funding sources through the establishment

of philanthropic alumni relations, private giving campaigns and the development of a STEAM Factory endowment fund.

CHAPTER 9:
STEAM FACTORY BOARD OF DIRECTORS AND PARTNERS

BOARD OF DIRECTORS

- **Sathya Gopalakrishnan, Chair**, Associate Professor, Agriculture, Environmental & Developmental Economics
- **Sam White, Director of University Involvement**, Associate Professor, History
- **Jim Fowler, Director of Outreach**, Assistant Professor, Mathematics
- **Lisa Hall, Director of Collaborative Research,** Assistant Professor, Chemical and Biomolecular Engineering
- **Jim Chen, Director of Funding and Grants,** Assistant Professor, Biomedical Informatics and Internal Medicine
- **Charlene Brenner,** Program Coordinator, The STEAM Factory

PAST STEAM FACTORY DIRECTORS

- **Roman Holowinsky, Chair**, Associate Professor, Mathematics
- **Arnab Nandi, Director of Collaborative Research**, Assistant Professor, Computer Science and Engineering
- **Johanna Devaney, Director of University Involvement,** Assistant Professor, Music
- **Gajan Sivandran, Director of Funding and Grants,** Assistant Professor, Hydrology

ADVISORS

- **Stephen Myers**, Associate Provost, Office of Outreach and Engagement
- **Christopher Hadad,** Dean**,** Natural and Mathematical Sciences
- **Janet M. Weisenberger,** Senior Assoc. Vice President, Office of Research

UNIVERSITY PARTNERS

- **Kay Wolf,** Vice Provost, Academic Policy & Faculty Resources
- **Carol Diedrichs**, Director, University Libraries
- **Caroline Whitacre,** Vice President for Research
- **Scott Self,** Chief Advancement Officer
- **Charles Lockwood,** Dean, College of Medicine
- **David B. Williams,** Dean, College of Engineering
- **Bruce McPheron,** Vice President of Agriculture Administration
- **Mike Hofherr,** Vice President & Chief Information Officer
- **Matt McNair,** Vice President, Office of Business and Finance
- **Susan Williams,** Vice Dean, College of Arts and Sciences
- **Mike Boehm,** Vice Provost for Academic and Strategic Planning
- **David Manderscheid,** Executive Dean and Vice Provost, College of Arts and Sciences
- **Wayne Carlson,** Vice Provost & Dean, Undergraduate Education
- **Damon Jaggers, Vice Provost and Director,** The Ohio State University Libraries
- **Janet Weisenberger,** Senior Associate Vice President, Office of Academic Affairs
- **Chris Hadad,** Dean, Natural & Mathematical Sciences
- **Christopher Hans**, Associate Professor, Statistics
- **Luis Casian,** Professor & Chair, Mathematics
- **Janis Browning,** Program Coordinator, Outreach and Engagement
- **Adrienne Nazon,** Vice President of Marketing, Chief Marketing Officer
- **Elizabeth Newton,** Director of the Battelle Center
- **Mary Juhas,** Associate Vice President, Ohio State ADVANCE, Associate Vice President for Gender Initiatives in STEMM
- **Elena Irwin,** Associate Director, CURA, Professor, Department of Agricultural, Environmental and Development Economics
- **Jessica Phillips,** Senior Instructional Designer, Distance education and eLearning
- **Amy Spellacy,** Administrator, Communities of Practice, Discovery Themes
- **Jenna McGuire,** TDAI Project Coordinator
- **Cathann Kress,** Vice President for Agricultural Administration and Dean, College of Food, Agricultural, and Environmental Sciences
- **Valerie Williams,** Professor, Associate Dean for Outreach and Engagement, College of Arts and Sciences

INDUSTRY PARTNERS

- **Tom Murnane**, ARC Business Advisors
- **William (Rod) Sharp,** ASC Alumni Board
- **Jeff Sharp,** Story Mining & Supply Co.

- **Thomas Dann,** JP Morgan
- **Steve Habash,** Perez & Morris
- **Jennifer McNally**, Columbus Arts Marketing Association
- **Scott Gale**, ASC Alumni Society
- **Eric Burgess**, ASC Alumni Society
- **Craig Friedman,** ASC Alumni Society
- **Joe Heimlich,** COSI
- **Cindy Foley,** Columbus Museum of Art
- **Laura Edmond,** Columbus Museum of Art
- **David Spurlock,** Hilton, Columbus/Downtown
- **Jim Sweeney**, Franklinton Urban Empowerment Lab
- **Kris Howell,** Columbus Idea Foundry
- **Leonard Niebauer,** 400 West Rich
- **Azuka MuMin,** COSI
- **Jordan Davis**, Columbus Partnership
- **Stephen Pence,** Strongwater
- **Chuck Wiles,** 400 West Rich
- **Eva Bradshaw,** National Center for Women in Technology