STEM ecosystems

Cultivate. Learn. Innovate.

ANNUAL REPORT
YEAR 1

September 1, 2015 – June 30, 2016

STEM Funders Network
STEM Learning Ecosystems Initiative

STEM
Funders Network

TIES | TEACHING INSTITUTE
FOR EXCELLENCE IN STEM

History: STEM Learning Ecosystems Initiative

The STEM Funders Network officially launched the STEM Learning Ecosystems Initiative at CGI America 2015 with the release of a nationwide Request for Qualifications process in June 2015. The STEM Learning Ecosystems Initiative was built on the STEM Funders Network's investment in four critical reports in recent years. The following four reports have garnered widespread attention and have sparked robust discussion among STEM educators, policymakers, funders and other key stakeholders:

1. *Prepare and Inspire: K-12 Science, Technology, Engineering, and Math (STEM) Education for America's Future a report prepared by the President's Council of Advisors on Science and Technology*;

2. *How Cross-Sector Collaborations are Advancing STEM Learning (2014)*;

3. *STEM Integration in K-12 Education: Status, Prospects, and an Agenda for Research (2014) a study by the National Academy of Engineering and the Board on Science Education of the National Research Council*; and

4. *STEM Learning Is Everywhere: Summary of a Convocation on Building Learning Systems (2014) report by the National Research Council.*

These reports all come to similar conclusions:

- STEM learning must be cross-disciplinary and integrated along all learning platforms, both in and out of school, over the learning continuum from Pre-K to post-secondary to workforce. The development of this core architecture is a critical condition to any success.

- Only through thoughtful and strategic planning and collective efforts will young people will be able to engage fully in true project-based immersive learning experiences that stimulate their interest, enthusiasm and engagement leading to rigorous STEM learning.

- Young people can and should experience STEM learning everywhere.

Intent: STEM Learning Ecosystems Initiative

Building off the findings of the reports listed above, the STEM Learning Ecosystem Initiative was designed to empower local communities to thrive through collaboration and communication to deliver results for students, educators and business leaders. The Initiative believes STEM Learning Ecosystems possess the tools and knowledge to create change. Just as STEM education has embraced innovation at the program level, it must also embrace innovation at the infrastructure level. Community partners across sectors must do more than merely coordinate efforts. Stakeholders must work cohesively at a new, deeper level to provide more students with quality learning in and out of school. It will require Ecosystem members to properly scale efforts to serve as many students as possible. Communities in collaboration are in the best position to change the conversation about quality growth for STEM education.

What is a STEM Learning Ecosystem?

A STEM learning ecosystem encompasses schools, community settings such as after-school and summer programs, science centers and museums, and informal experiences at home and in a variety of environments that together constitute a rich array of learning opportunities for young people. A learning ecosystem harnesses the unique contributions of all these different settings in symbiosis to deliver STEM learning for all children. Designed pathways enable young people to become engaged, knowledgeable and skilled in the STEM disciplines as they progress through childhood into adolescence and early adulthood.

STEM Learning Ecosystems unite all community stakeholders to ensure that all students and people are engaged STEM learners who are competent and college and career ready, that the educational system and its out-of-school time partners are equipped with the resources they need to engage, teach and develop STEM competency, and that communities thrive through a robust and competitive STEM skilled workforce. STEM Learning Ecosystems develop their knowledge, strengthen their persistence and nurture their sense of identity and belonging in STEM disciplines. STEM ecosystems enable young people to connect what they learn in and out of school with real-world learning opportunities, leading to STEM literacy, further education and careers.

Goals, Key Activities, and Milestones

The STEM Funders Network STEM Learning Ecosystems Initiative is designed to promote the cultivation of STEM Learning Ecosystems in communities throughout the country. Its purpose is to bring together these STEM Learning Ecosystems, contributing to the larger STEM education and learning landscape, and a robust and STEM skilled workforce.

The STEM Funders Network STEM Learning Ecosystems Initiative's goals for Year One were operationalized through the following key activities and milestones:

	Goal(s)	Key Activities	Milestones
1.	Select up to 25 local, regional and state STEM Learning Ecosystems from across the country to participate in year one, adding additional sites in subsequent years.	• Launch Request for Qualifications. • Develop review criteria and coordinate external review team. • Announce selections.	• 107 communities participated on outreach webinars. • 69 communities were invited to submit a RFQ. • 50 communities submitted RFQs. • 27 STEM Learning Ecosystems representing 17 states announced on September 3, 2015.
2.	Support communities in the design, cultivation and implementation of STEM Learning Ecosystems through expert technical assistance.	• Develop Technical Assistance Team. • Provide individualized technical assistance to 27 ecosystems through ongoing communications, on-site facilitation, and deployment of tools and resources. • Administer planning grant program. • Coordinate funder engagement meetings.	• 12 Technical Assistance Leads plus 7 content experts. • 3,100 hours of individualized technical assistance. • 54 in-person facilitated sessions (approx.). • 10 ecosystems completed community asset surveys with over 900 stakeholder responses. • 10 communities award $5-10k planning grants. • 22 funder engagement meetings.
3.	Support selected STEM Learning Ecosystems to participate in a national Community of Practice to share successes, challenges and opportunities for growth.	• Plan and host two National Community of Practice Convenings. • Plan and host monthly webinars among the National Community of Practice. • Plan 1st Annual Leadership Institute for summer 2016.	• 145 attendees participated at the Fall Community of Practice, November 11-12, 2015 in Washington, DC. • 143 attendees participate at the Spring Community of Practice, March 14-15, 2016 in Chicago, IL. • 8 programmatic and content specific webinars. Topics included The Connectory™, Every Student Succeeds Act, and LinkEngineering. • All ecosystem leads participate in two-day leadershi p institute. Although planned in Yr. 1 the Institute occurred in Yr. 2 and will be reported on in the Yr. 2 annual report.
4.	Inform the STEM education field about the importance of creating connected STEM-rich learning opportunities for children, youth and their families across the educational continuum from preschool through higher education.	• Develop and launch a public facing website for the Initiative communications. • Develop monthly newsletter for external audiences. • Develop internal web-platform to share information and encourage ongoing discussions between the National Community of Practice. • Develop communications strategy for social media. • Develop Communications Toolkit for ecosystems.	• Launched public facing STEM Learning Ecosystems website in March 2015. Average 200 page views per day and a 74.9% increase in new visitors since June 1, 2016. • 4 newsletters have been sent out with an average open rate of over 30% and a distribution list of 800. • Launched internal Google Site among National Community of Practice in January 2016. • Launched communications strategy via social media (Facebook and Twitter). • Developed by Widmeyer Communications, a comprehensive Communications Toolkit will be launched at the October 2016 Community of Practice.

Highlights
Cohort 1 STEM Learning Ecosystems

1. Arizona SciTech Ecosystem *(Phoenix, AZ)*
2. Bay Area STEM Ecosystem *(San Jose, CA)*
3. BoSTEM *(Boston, MA)*
4. Chicago STEM Pathways Cooperative *(Chicago, IL)*
5. Colorado STEM *(Denver, CO)*
6. East Syracuse Minoa Central School District STEM Learning Ecosystem *(East Syracuse, NY)*
7. ecosySTEM KC *(Kansas City, MO and Kansas City, KS)*
8. EvanSTEM *(Evanston, IL)*
9. Great Lakes Bay Regional STEM Initiative *(Freeland, MI)*
10. Greater Austin STEM Ecosystem *(Austin, TX)*
11. Greater Cincinnati STEM Collaborative *(Cincinnati, OH)*
12. Indiana STEM Ecosystem Initiative *(Indianapolis, IN)*
13. Interdisciplinary Science and Engineering Partnership in Western New York *(Buffalo, NY)*
14. Los Angeles Regional STEM Hub *(Los Angeles, CA)*
15. NC STEM Ecosystem: Driving the Future *(Research Triangle Park, NC)*
16. Northeast Ohio STEM Learning Ecosystem *(Cleveland, OH)*
17. NYC STEM Education Network *(New York, NY)*
18. Orange County STEM Initiative *(Corona Del Mar, CA)*
19. Oregon's Statewide Regional STEM Hub Network *(Salem, OR)*
20. Pittsburgh Regional STEM Ecosystem *(Pittsburgh, PA)*
21. Providence After School Alliance STEM Ecosystem *(Providence, RI)*
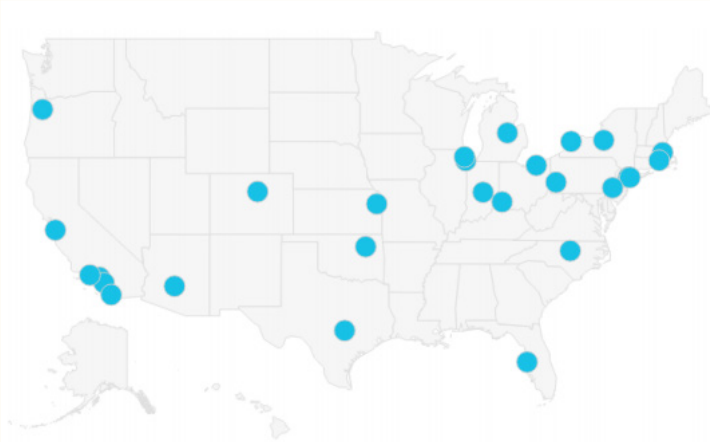22. Queens 2020 *(Corona, NY)*
23. San Diego EcosySTEM *(San Diego, CA)*
24. STEMcityPHL Regional Network *(Greater Philadelphia, PA)*
25. Tampa Bay STEM Network *(Tampa, FL)*
26. Tulsa Regional STEM Alliance *(Tulsa, OK)*
27. Ventura County STEM Regional Network *(Learning Ecosystem, Camarillo, CA)*

Official Launch:
Fall 2015 Community of Practice

The inaugural Community of Practice convened November 11-12, 2015 in Washington, DC. 145 people were in attendance, including representatives from all 27 communities, several guests and the majority of the STEM Funder Network members who are supporting the STEM Learning Ecosystem Initiative. The facilitated sessions allowed communities to engage around specific shared areas of concern and begin to process and share strategies.

The theoretical community of practice framework is based on the work of Etienne and Beverly Wenger-Trayner. Seven principles outlined by Wenger-Trayner guide the cultivation of the STEM Learning Ecosystem.

1   Design for Evolution
2   Open a dialogue between inside and outside perspectives
3   Invite different levels of participation
4   Develop both public and private community spaces
5   Focus on value
6   Combine familiar and excitement
7   Create a rhythm for the community.

Beyond the development of the national Community of Practice, an evening reception and dinner the first evening of the convening featured inspirational STEM student speaker, David Boone. The morning of the second day, attendees convened at the White House with two different panels that provided information on place-based strategies and equity issues facing STEM efforts across the country.

Spring 2016 Community of Practice

The Spring Community of Practice was held at the Chicago Marriott O'Hare in Chicago, IL from March 14 – 15, 2016. A total of 143 meeting participants (speakers, guests, Ecosystems, Technical Assistance Team, Evaluation Team, STEM Funders Network Members and staff) attended the convening.

Changes from Fall Community of Practice

In response to the feedback provided from the Community of Practice held in Washington, DC in November 2015, a number of changes were implemented to enhance the Ecosystem members' experiences at the convening. A few modifications included but are not limited to:

- Development of Practice Group themes relevant to issues raised through technical assistance;
- Implementation of Peer to Peer Learning and Support sessions based on expertise of fellow Ecosystem members;
- Structured time for Ecosystem members to meet internally and with their Technical Assistance Lead(s);
- Encouragement of communications via social media; and
- Deliberately scheduled time for Ecosystem members to network with each other.

Technical Assistance

During Year One, the Teaching Institute for Excellence in STEM (TIES) provided comprehensive technical assistance for the Ecosystems and the Community of Practice, including:

1   building a team of expert systems-builders and content specialists to provide technical assistance (TA) directly to Ecosystems;
2   management and content development of the Community of Practice convenings and webinars; and
3   administration of the planning grant program.

Key deliverables for Year One:

- Assignment of a dedicated TA Lead to each community.
- Finalization of a TA Manual for overall project management including roles and responsibilities and other procedures.
- Developed TA tools and resources used by STEM Learning Ecosystems including a community asset survey and quarterly reporting templates.
- Planned and executed Design Studios and other on-site facilitated sessions to help STEM Learning Ecosystems develop their design principles, governance structures and models, identify new partners and begin working towards further cultivation of STEM ecosystems.
- Established communication schedules with each of the 27 STEM Learning Ecosystems.
- Coordinated all monthly webinars including identifying topics and speakers.

Based on experiences in the field several patterns emerged:

- Several comunities experienced significant changes in leadership from the original RFQ applicant team. Subsequently, ramping up of the work was delayed; however, all were able to reassembled teams and by the mid-point of year one, were fully committed to the work.
- A number of communities presented their readiness in aspirational tones which resulted in a longer ramp up process to the work as the TAs engaged in more basic community building at the outset.
- Several of the more mature communities used the ecosystem TA and framework as an opportunity to re-design their organizations into STEM 2.0.
- Communities tended to have some sector bias based on the origin of the community lead, i.e., school district lead communities tended to be overly focused on K-12 education, or business/industry lead communities tended to be overly focused on workforce development. All were sensative to the need to intentionally engage under-represented sectors to provide balance and differentiated POV.

" The most valuable aspect was the networking with the experts assembled and being together, as a local team, to continue to work through thoughts around our plans."

- STEM Learning Ecosystem Member

> " *Baltimore can't wait to join this innovative learning community and take advantage of the technical assistance and capacity building to fully launch and implement Bmore STEM as a robust STEM Ecosystem coordinating and aligning Baltimore's STEM rich resources for the benefit of all our young people.*"
>
> *- Ellie Mitchell, Director, Maryland Out of School Time Network*

INTERNAL SITE USERS

55%   45%

● New Visitor   ● Returning Visitor
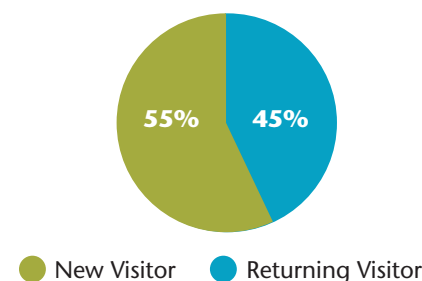
Communications

As with any large scale initiative, communications has played a critical role. The strategic communications plan for the initiative had two phases for Year One. Phase One consisted of a short term plan, and implementation began in the Fall of 2015. The second phase is the development of the longer term strategic communications and marketing plan. Phase Two will be completed in Fall 2016.

Key deliverables for Year One:

● Launched public facing website for the STEM Learning Ecosystems Initiative: www.stemecosystem.org. The website includes research and resources specific to STEM cross-sector collaborative projects and research, as well as general information about the Initiative. The public facing STEM ecosystem site sees an average of 200 page views per day and a 74.9% increase in new visitors since June 1, 2016. Since the internal site's launch in March 2016, we have seen a 45.16% increase is new users.

● Launched an internal Google Site to encourage peer-to-peer sharing among Community of Practice members. The website consists of a contacts list, webinar archive, resource folders, and a discussion board. The website has nearly 300 registered users.

● Launched a Facebook page https://www.facebook.com/STEMecosystems/

● Established a Twitter presence through the creation of a handle and hashtag for the Initiative. @STEMecosystems handle earned an average of 215 impressions per day and 6.6k in total.

Evaluation

The STEM Learning Initiative has incorporated multiple data points to inform the direction of the initiative and cultivation of Ecosystems. To that end, in Year One, three evaluation elements were commissioned.

The University of San Diego's Center for Education Policy and Law was asked to conduct a first year baseline study of the initiative. The first year study of the STEM Learning Ecosystems Initiative used a qualitative approach to understand the factors that various stakeholders define as critical to the development of a STEM Learning Ecosystem and a National Community of Practice. Acknowledging the value placed on cross-sector collaboration to an ecosystem, the study took an in-depth look at the role of diverse partnerships as one factor of interest. The research has helped inform the design of Year Two of the Initiative.

The PEAR Institute: Partnerships in Education and Resilience conducted a STEM Ecosystem Assessment Inventory. The Inventory sought to understand and compile all instruments and assessment methods utilized by the 36 Ecosystems. The response rate was an astounding 100% and affirms the value Ecosystems place on assessment. The research has helped inform the Initiative and will be shared with the Ecosystems in Fall 2016.

Finally, the STEM Learning Ecosystem conducted internal surveys following each in-person community of practice convening. The results from the surveys directly informed the design of each convening. In addition to design of the convenings, the survey helped in the creation of and viability of practice groups.

AmeriCorps VISTA

In partnership with the Corporation for National and Community Service and the Afterschool Alliance, the STEM Learning Ecosystems Initiative began deployment of AmeriCorps VISTA members into eligible STEM Learning Ecosystems in Fall 2016. The AmeriCorps VISTA members will help play a critical role for STEM Ecosystems by providing additional capacity to build permanent infrastructure through partnership building, community outreach, mapping of STEM resources, research and writing grants, and creating resources. The STEM Learning Ecosystem Initiative is funding a portion of the funds per VISTA, and the Ecosystem is providing a portion of matching funds. The Schusterman Foundation, Broadcom Foundation, Simons Foundation and Samueli Foundation are generously supporting the AmeriCorps VISTA project.

The following Ecosystems have VISTAs joining their team this Fall.

AZSTEM (2)

Bay Area (1)

Great Lakes Bay (1)

ecosystem KC (1)

Tulsa Regional STEM Alliance (2)

Oregon (2)

STEMcityPHL (2)

San Diego Ecosystem (2)

Welcome Ten New Ecosystem Communities

On May 19, 2016 at the US News STEM Solutions Conference, the SFN announced the addition of ten ecosystem communities to join the national STEM Ecosystems Initiative comprised of the inaugural 27 ecosystem communities across the United States. The selected sites from across the United States have committed to collaborate and share their work towards this common vision.

The ten incoming ecosystem communities joined their national colleagues in creating integrated STEM learning opportunities for millions of youth across the county.

The following ecosystem communities were selected to become part of this national STEM Learning Ecosystems Initiative:

- Bmore STEM (Baltimore, MD)
- Carbon/Schuylkill/Luzerne Counties Ecosystem (Schnecksville, PA)
- Central NM STEM-H Education Hub (Albuquerque, NM)
- Central Oklahoma Regional STEM Alliance (Oklahoma City, OK)
- DC STEM Network (Washington, DC)
- Downstate East STEM (Maine)
- Northeast Florida STEM Hub (Jacksonville, FL)
- Lancaster County STEM Alliance (Lancaster, PA)
- North Louisiana STEM Alliance (Shreveport, LA)
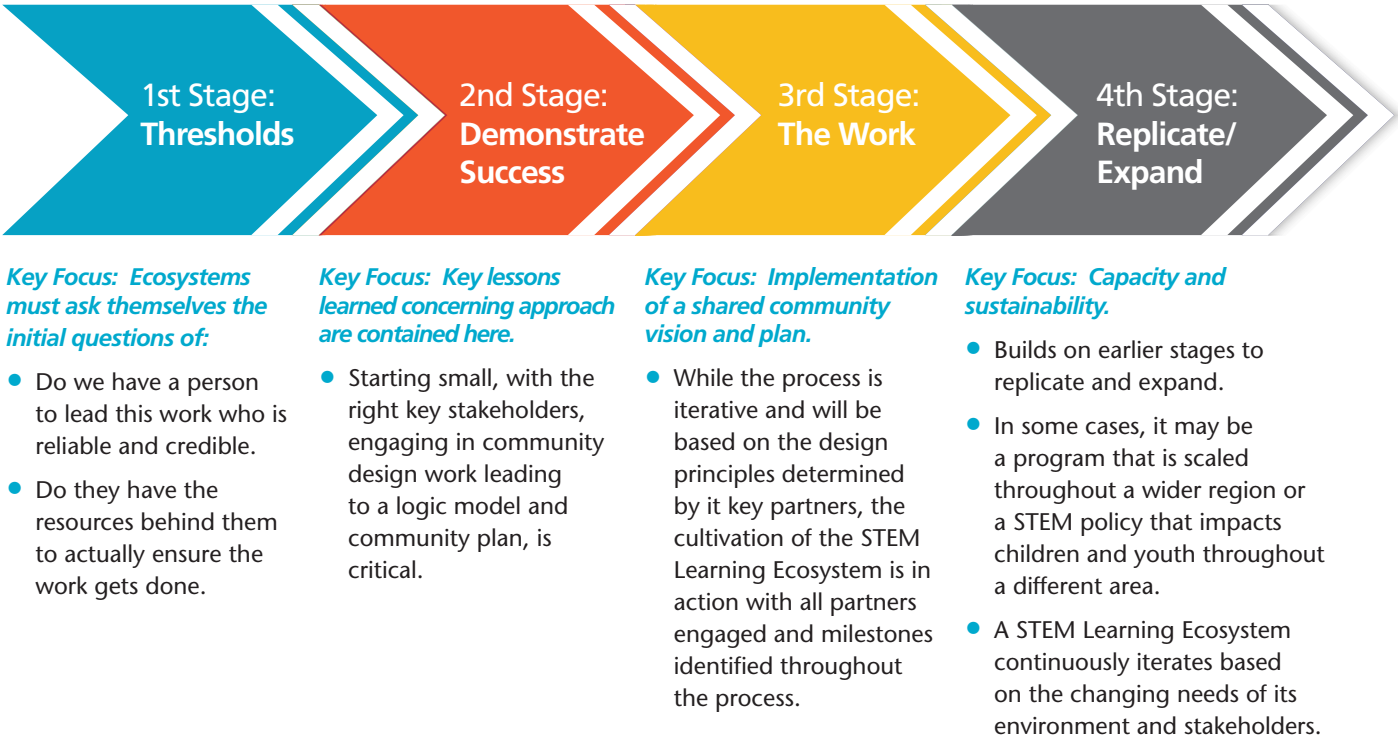- Omaha STEM Ecosystem (Omaha, NE)

Leadership Institute

The inaugural STEM Learning Ecosystems Leadership Institute was held July 2016 in Newport Beach, CA and focused on Designing the Future of the National STEM Learning Ecosystem including leadership professional development and training, cultivating local Communities of Practice, prioritizing practice groups, tool evaluation, designing Community of Practice convening and agenda topics. Leaders from all STEM Ecosystems attended. In its first year, the Samueli Foundation generously supported the Leadership Institute.

Year Two: Next Steps

Over the course of the Year One, the Technical Assistance Team identified the following stages as indicators for future success based on field work with the ecosystems. These four stages represent a refinement of the original goals created last year, informed by the lessons learned from Year One to more efficiently advance Year Two.

1st Stage: Thresholds	2nd Stage: Demonstrate Success	3rd Stage: The Work	4th Stage: Replicate/ Expand

Key Focus: Ecosystems must ask themselves the initial questions of:

- Do we have a person to lead this work who is reliable and credible.
- Do they have the resources behind them to actually ensure the work gets done.

Key Focus: Key lessons learned concerning approach are contained here.

- Starting small, with the right key stakeholders, engaging in community design work leading to a logic model and community plan, is critical.

Key Focus: Implementation of a shared community vision and plan.

- While the process is iterative and will be based on the design principles determined by it key partners, the cultivation of the STEM Learning Ecosystem is in action with all partners engaged and milestones identified throughout the process.

Key Focus: Capacity and sustainability.

- Builds on earlier stages to replicate and expand.
- In some cases, it may be a program that is scaled throughout a wider region or a STEM policy that impacts children and youth throughout a different area.
- A STEM Learning Ecosystem continuously iterates based on the changing needs of its environment and stakeholders.

Strategies to Advance Individual STEM Learning Ecosystems:

- Ensure the Ecosystem has identified a credible and respected leader who has the capacity to move their respective Ecosystemforward,
- Connect various community stakeholders to coalesce in school, out-of-school, and community stakeholders with the purpose of building STEM skills for their learners.
- Facilitate dialogue among the partners to develop sustaining ecosystems that are strategic, action oriented, and thrive on communication and sharing among themselves.
- Build capacity and fill gaps within each STEM Learning Ecosystem.
- Manage the collaborative work of the STEM Learning Ecoystems through a TA lead who will help identify needs, facilitate collaboration, and provide access to additional assets and information.
- Provide connections to communities that offer best practices, tools, or solutions of value to others.
- Faciliate the evolution and development of practice groups, in-person and in virtual forums.
- Coordinate two in-person Community of Practice Convenings.
- Faciliate a Leadership Institute to continue to develop leadership skills.
- Provide a communications toolkit to equip stakeholders with messaging and resource development tools.
- Coordinate funder engagement convenings to help inform regional funders about their respective STEM Learning Ecosystems.
- Develop a standard rubric that will include a pre and post assessment to help STEM Ecosystems establish baselines and understand changes and impact.
- Coach more mature STEM Ecosystems to become mentors to other STEM Ecosystems.

THANK YOU

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Overdeck Family Foundation

Pinkerton Foundation

Samueli Foundation

Simons Foundation

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