

NISE NATIONAL INFORMAL STEM EDUCATION **NETWORK**

WELCOME!

ASTC Breakfast | 2022

Overview

- **Introduction to the NISE Network**
- **Opportunities to get involved and stay connected**
- **Discussion and activity**

The NISE Network brings people together to **engage in STEM**, understand our world, and build a better future for everyone.



We create and share **products, practices, and materials** with partner organizations across the country.



Our resources

are available to everyone for free download from nisenet.org.

Hundreds of organizations participate in the NISE Network, including museums and universities.

Our community

includes educators,
researcher/evaluators,
and scientists.



Partner organizations use Network resources to engage learners in their communities.

Local use

brings people together to share and learn from each other.



Together we reach **millions of people** each year!

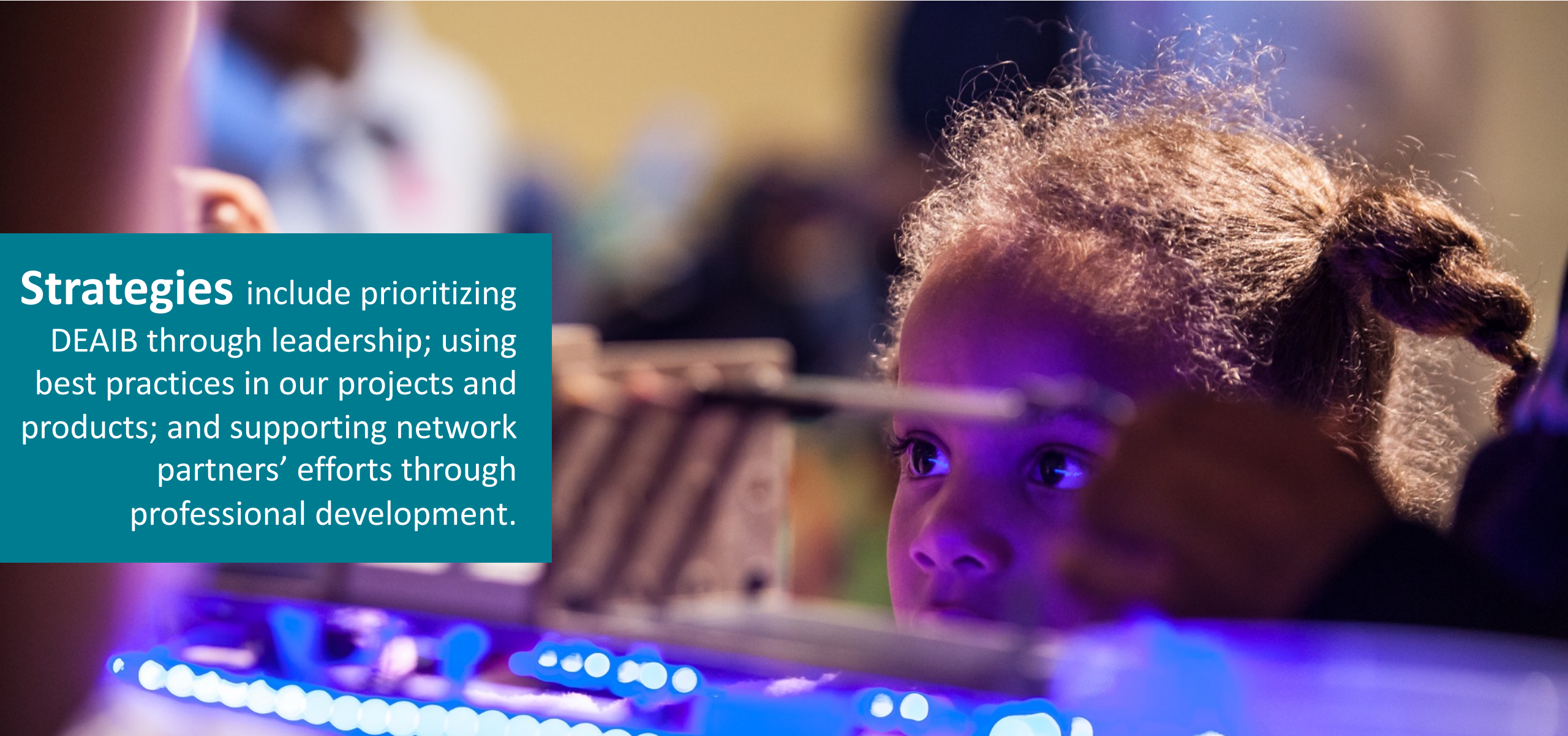


Our impact

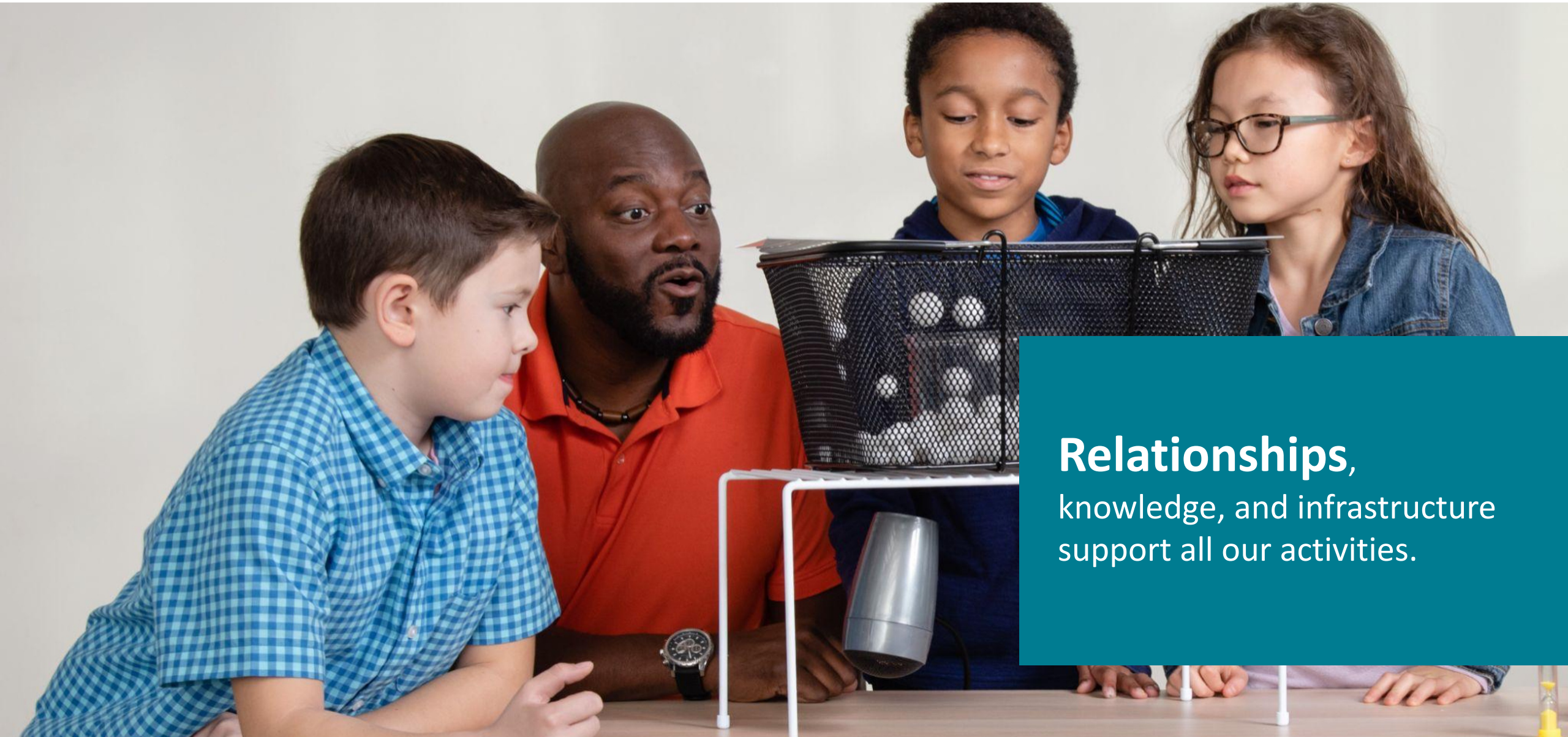
grows through the efforts of our partner organizations.

We are committed to **diversity, equity, accessibility, inclusion, and belonging (DEIAB)**.

Strategies include prioritizing DEIAB through leadership; using best practices in our projects and products; and supporting network partners' efforts through professional development.



Network projects tackle challenging problems and develop knowledge, tools, and practices.



Relationships,
knowledge, and infrastructure
support all our activities.

Our projects focus on many areas of **STEM**.



Nanotechnology
2005-2017



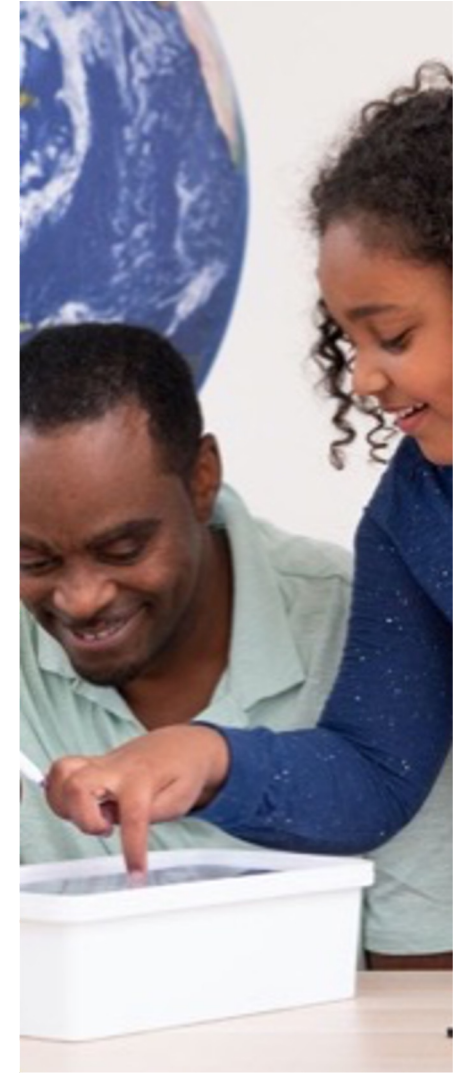
Synthetic biology
2014-2018



Chemistry
2016-2019



**Responsible
innovation**
2015-2019



Sustainability
2016-2017, 2019-2022

Projects provide **opportunities** to get involved.



Earth and space

2016-2023, 2022-2025,
2019-2022, 2020-2023,
2022-2024, 2022-2025



Changing brains

2018-2020, 2021-2023



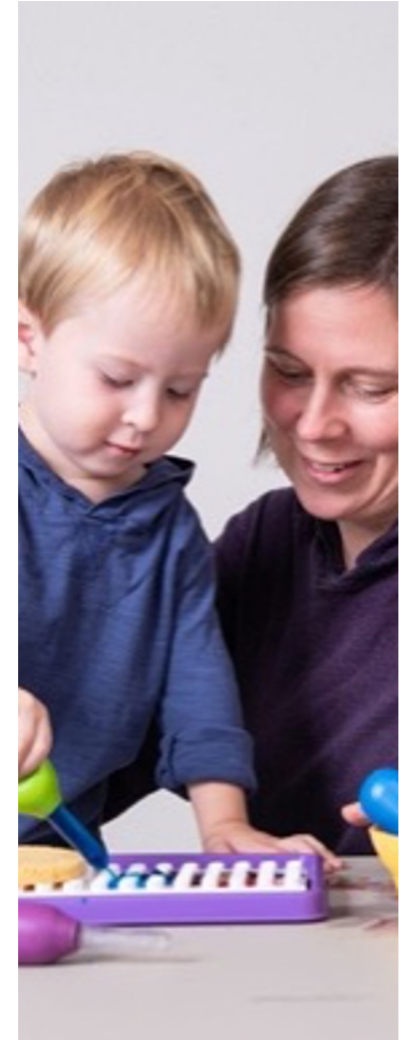
Climate resilience

2020-2022



Radio waves

2020-2024



Learning ecosystems

2021-2025

Opportunities to get involved

How to get involved

Use our resources

- STEM public engagement materials
- Professional learning resources

Connect with us

- Online
- In person

Take one home!



Projects and Opportunities

Revised 5-1-2022

The National Informal STEM Education Network is a community of informal educators and scientists dedicated to supporting learning about science, technology, engineering, and math (STEM) across the United States. NISE Network brings people together to engage in STEM, understand our world, and build a better future for everyone.



Making Waves

Hands-on activities, mobile apps, and camp curriculum on the science, technologies, and societal implications behind radio wave communications.

- Free digital materials [coming in 2023: www.nisenet.org/making-waves-with-radio](http://www.nisenet.org/making-waves-with-radio)
- Funding: NSF through BSCS Science Learning



Voyage through the Solar System

Hands-on activities, DIY apps, and training materials about our solar system and human space exploration; 350 kits to past Explore Science: Earth & Space kit recipients (2023).

- Funding: NASA through Sciencenter
- Free digital materials [coming in 2023: www.nisenet.org/voyage-solar-system](http://www.nisenet.org/voyage-solar-system)



Changing Brains

An evolving project for public and professional audiences to talk about personal, community, and societal connections of brain research and related technologies.

- Free digital materials [coming in 2024: www.nisenet.org/brain](http://www.nisenet.org/brain)
- Funding: the Dana Foundation, The Kavli Foundation



STEM Learning Ecosystems

Professional resources to support lifelong learning using principles and practices of successful STEM Learning Ecosystems.

- Free digital materials [coming in 2024: www.nisenet.org/stem-learning-ecosystems-project](http://www.nisenet.org/stem-learning-ecosystems-project)
- Funding: NASA through Arizona State University



Explore Science: Earth & Space

Professional learning and public engagement resources about Earth and space science; 350 toolkits distributed in 2017-2020; Moon Adventure Game distributed in 2020.

- Webb Space Telescope resources: www.nisenet.org/webb
- Solar Eclipses October 14, 2023 & April 8, 2024: www.nisenet.org/solareclipse
- Free digital materials: www.nisenet.org/earthspacekit & www.nisenet.org/moongame
- Funding: NASA through Arizona State University and Arizona Science Center



Sustainable Futures

Professional development and public engagement resources about sustainability (2019-2022); hands-on activities and training materials (2016, 2020).

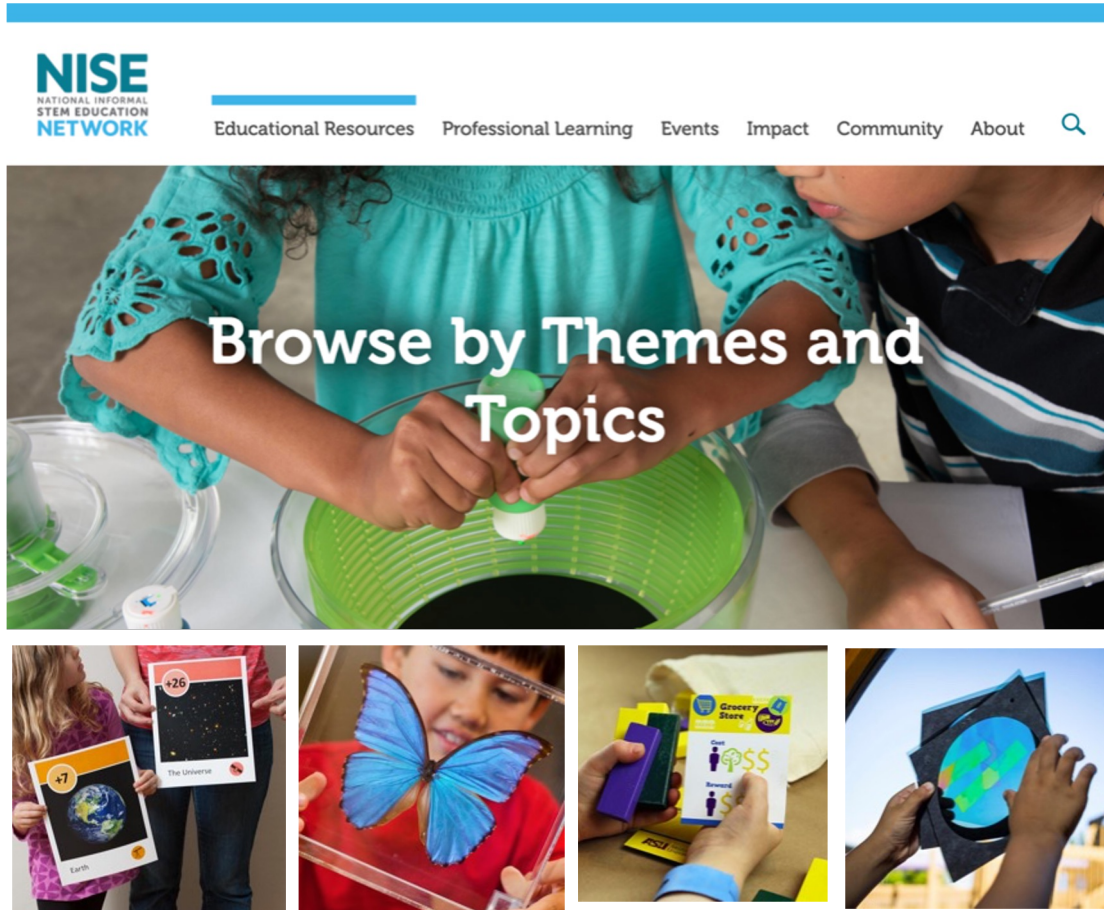
- Free digital materials: www.nisenet.org/sustainability
- Funding: Rob and Melani Walton Foundation and IMLS through Arizona State Univ.



Howtosmile.org At-Home Activities Collection

- Professional resources, framework, and hands-on STEM activities created by a cohort of NISE Network partner museums to support at-home learners (2021-2022).
- Free digital materials: howtosmile.org/topics/athome
- Funding: IMLS through Children's Creativity Museum

Use our **free resources** on nisenet.org and howtosmile.org



NISE
NATIONAL INFORMAL
STEM EDUCATION
NETWORK

Educational Resources Professional Learning Events Impact Community About

Browse by Themes and Topics

nisenet.org/browse-topic



Updated for 2022

At-Home Activities Collection

howtosmile.org/topics/athome

Recent Public Engagement and Professional Learning Resources

Featured STEM engagement resources on nisenet.org



nisenet.org/diy-sun-science-app



nisenet.org/explore-mars-rover-game



nisenet.org/forums

Featured professional learning resources on [nisenet.org](https://www.nisenet.org)



[nisenet.org/making-relevant-inclusive](https://www.nisenet.org/making-relevant-inclusive)



[nisenet.org/ sustainability](https://www.nisenet.org/sustainability)



<https://www.nisenet.org/pd/training-videos>

Upcoming Projects

Earth & Space



Sparkling Interest in STEM + Engaging Hispanic communities

New activities and exhibition in 2024-2025



Voyage through the Solar System

New activities and app 2023 & 2024



Mars Habitat exhibit component

Sun, Earth, Universe exhibition in 2023

Changing brains



Neuroscience, ethics, and technologies

Hands-on activities in 2023



Public brain data

A large scale neuroimaging study to understand language development that will produce a publicly available brain data set.

Studies of healthy individuals require trust in medical research systems, potentially valuing societal over individual benefit. As large datasets are shared, there are also issues of data privacy and consent.

TECHNOLOGY CARD



Mental illness diagnostics

A new, rapid, low-cost diagnostic tool that focuses on genetic and neurochemical correlates of symptoms.

Medical models of mental illness may reduce self-blame and increase seeking treatment, but reduce a person's belief in their own autonomy.

TECHNOLOGY CARD



Military general

You lead a specialized military unit that tests experimental technologies to protect soldiers in dangerous situations. You lost a leg during wartime and deeply understand the sacrifices soldiers make. Based on the emerging security threats all across the world you are especially interested in safe and long-term solutions to enhance mental and physical performance of those serving under you. Much of your unit's work is highly classified due to its sensitive nature.

STAKEHOLDER CARD



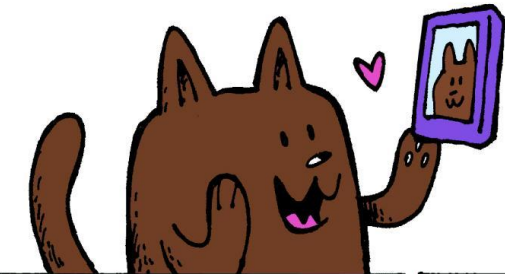
Video game designer

After an injury suffered in a car accident, you became paralyzed from the neck down. Your injury causes chronic pain and you wonder how research might lead to future treatments. Recently you learned about the Cybathlon, an international competition that helps develop assistive technologies for people with disabilities, and you're interested in getting involved with the brain-computer interface event.

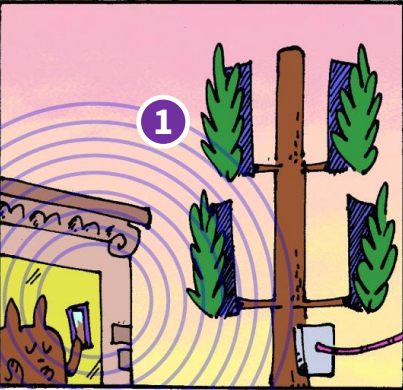
STAKEHOLDER CARD

Making Waves with Radio

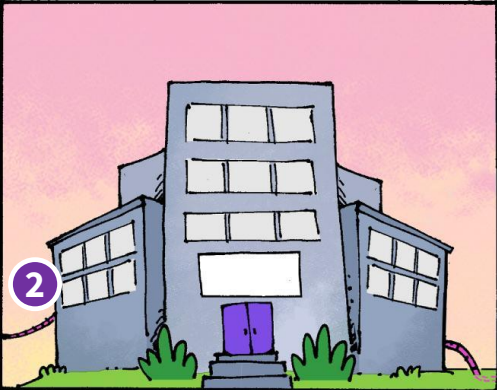
Let's Send a Selfie in Wavetown



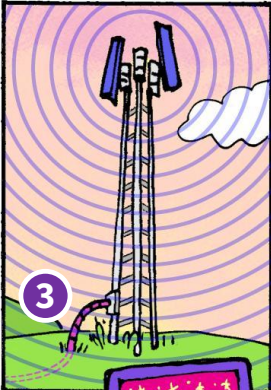
“These filters are really funny. I’ll send a silly selfie to my friend James.”



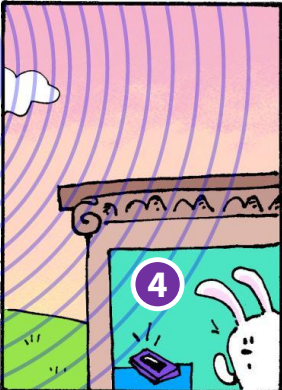
1. Radio waves created by the phone's antenna carry the data from Dolores' selfie across the air until it hits the nearest receiving cell tower.



2. The receiving cell tower sends the data through a fiber optic cable to a cell phone company's computer that identifies a transmitting cell tower close to James.



4. The transmitting cell tower sends out radio waves in all directions and are picked up by an antenna in James' phone, which reads the selfie data.



“These selfie filters are getting out of control.”

Learner resources

Craft-based toolkit and digital apps in 2023

Radio Explorers Radio Silence

Try this!



1. First, lay out a selection of items. Turn on the radio and tune to a station. How does the radio signal sent from a station's transmitter miles away get to your device?
Tip: After a station has been selected, place a piece of tape over the lower and volume dials so they do not change during the experiment.

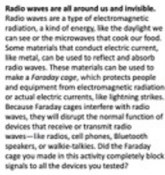


2. Try making a shell of wrapping materials around your device or placing it in a container. Try to block the signal! Which materials work best at blocking the radio waves?
3. What changes when you raise or lower the antenna? Does your shell have to cover the whole radio or just part of it to affect the radio waves? Try touching the radio inside your container. What happens? Are you surprised?



4. Now, try testing your shell again with another radio device, like a Bluetooth speaker or a walkie-talkie. Is it easier or harder to block the signal to these devices? Do the same materials work?

Radio waves transfer energy that can be reflected or absorbed, or pass through materials.



Radio waves are all around us and invisible. Radio waves are a type of electromagnetic radiation, a kind of energy, like the daylight we can see or the microwaves that cook our food. Some materials that conduct electric current, like metal, can be used to reflect and absorb radio waves. These materials can be used to make a Faraday cage, which protects people and equipment from electromagnetic radiation or actual electric currents, like lightning strikes. Because Faraday cages interfere with radio waves, they will disrupt the normal function of devices that receive or transmit radio waves—like radios, cell phones, Bluetooth speakers, or walkie-talkies. Did the Faraday cage you made in this activity completely block signals to all the devices you tested?

There are many uses of radio technologies in modern communications, from broadcasting a band's latest song on a radio station to receiving important navigation signals from a satellite. To prevent a giant mix-up of radio waves and their functions, different devices use different radio frequencies. Low radio frequencies have longer radio wavelengths, while high radio frequencies have shorter radio wavelengths. These differences are why we can receive cell phone calls inside a building, but not inside an underwater tunnel, or why AM radio signals can get lost going under overpasses, but FM radio keeps working. The choice of materials for your Faraday cage may allow you to examine some of the differences in radio waves used by various communication devices.

Engaging the Public in Radio:

Key Concepts in the Science, Engineering, and Social Impacts of Radio Frequency Technologies



Professional resources

Online PD and activity guides in 2023

STEM learning ecosystems



STEM LEARNING
ECOSYSTEMS



Principles and practices of community-wide learning ecosystems

Professional development in 2024

Solar Eclipses



October 14, 2023
And
April 8, 2024

Online workshop in October
nisenet.org/events

nisenet.org/solareclipse

Map courtesy Michael Zeiler of GreatAmericanEclipse.com

Opportunity from the Museum of Science in Boston

- **Co-creation community discussions on a community driven topic**
- Examples of projects have included affordable housing and mental health
- **Stipend of \$8,000 plus travel support**
- Apply by November 1, 2022
publicengagementwithscience.org
- **Questions?** see Susan Heilman & David Sittenfeld



Opportunity from the Arizona Science Center

- **Moon Adventure Game training**
- Today at 9:30am
- Westin Hotel, Butler Room (down hall)
- participants will receive a \$200 materials stipend in the form of an Amazon Gift Card. Limit one gift card per institution.
- **Questions?** see Sari Custer



How to stay in touch

Learn more and access online digital resources:

nisenet.org



Subscribe to the monthly newsletter:
nisenet.org/newsletter

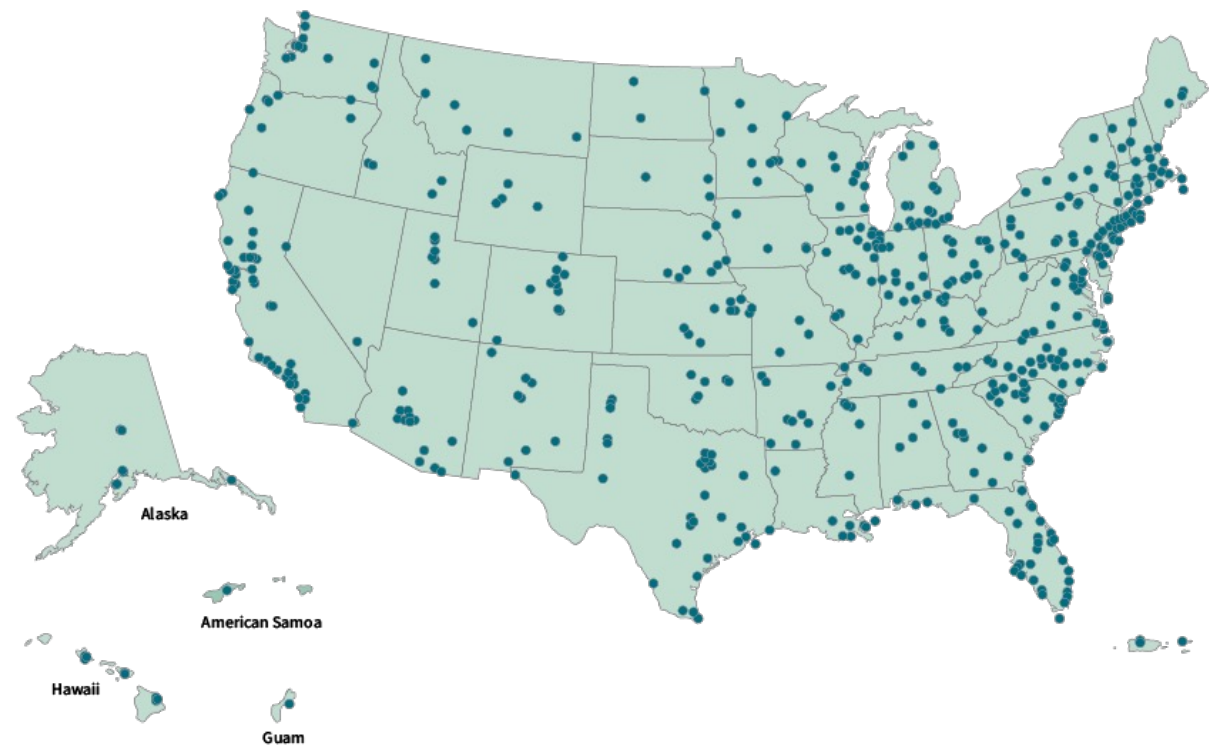
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NISE Network Partner Organizations

2016–present



Thank you



Support from the National Science Foundation: *Nanoscale Informal Science Education Network* (#0532536, #0940143), *Multi-Site Public Engagement in Science* (#1421179), *Increasing Learning and Efficacy about Emerging Technologies* (#1516684), *ChemAttitudes* (#1612482), *Wireless Radio Communications* (#2005784), *Co-Created Public Engagement with Science* (#1811118). Any opinions, findings, and conclusions or recommendations expressed in this presentation are those of the authors and do not necessarily reflect the views of the Foundation.



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Support from NOAA: *Citizen Science, Civics, and Resilient Communities* (#NA18SEC0080008)



Support from IMLS: *Sustainable Museums* (#MG-245910-OMS-20) and *How to Smile* (#CAGML-246996-OMLS-20).



Support from Rob and Melani Walton Foundation: *Sustainability in Science and Technology Museums*.



Support from The Kavli Foundation: *Changing Brains*.



Support from Dana Foundation: *Barbara Gill Civic Science Fellowship*.

Discussion and activity

Discuss with others at your table

Do you have ideas for future online workshops?

- Write them down on the index cards at your table

What does *belonging* mean to you?

- As a professional
- As a learner and community member
- As a group or organization

Stand up

Improv games

- Staff and volunteer skill building
- Meeting icebreakers and stretch breaks
- Team and relationship building

Let's play Red Ball!



“Red Ball” Improv Exercise

All participants stand in a circle. The group leader introduces mimed balls to the group and assigns them different colors (e.g., “This is a red ball”). The group then passes the mimed ball around the circle. As the group becomes comfortable passing the first mimed ball, the group leader introduces balls of different colors. The group tries to keep all of the balls moving around the circle at the same time.

Skill sets

Teamwork, Accepting Offers, Listening/Awareness, Quick Thinking, Energy

Time to implement
5-8 minutes

Number of participants
8-12 people per group

Exercise flow

1. Have all participants stand in a circle.
2. Explain that the group is going to pass around a pantomimed ball.
3. Introduce the first ball as a red ball.
4. Explain that to pass the ball a participant will offer the ball to another player by saying “Red Ball?”. The receiving participant will then acknowledge the offer by restating the color of the ball... “Red Ball”. Next the player tosses the mimed Red Ball to the person. When they person catches the ball they thank the person (Thank you, Red Ball), and then offers the ball to another person in the circle.
5. Give the group an example of passing the ball.
A: “Red Ball?”
B: “Red Ball!”
A tosses the ball; B catches the ball
B: “Thank You, Red Ball.”
6. Allow the group to pass the Red Ball around and solidify the communication of offer and accept.
7. Stop the group and introduce a second ball with a different color.
8. Explain that this time the group will pass both balls around the circle. Remind the group to keep the same communication pattern and keep the balls separate.
9. Allow the group to pass the two mimed balls around the circle.
10. Introduce a third and fourth ball into the mix without stopping the group.
11. Allow the group to pass all four mimed balls around the circle.
12. Stop the group and quickly debrief.
13. If time permits, restart the exercise and allow the participants to add their own balls to the group. Explain that you will call out the name of a participant and have them add in a new ball to the circle. The participant will label the ball. Encourage them to be creative.

Debrief questions

1. What three components do you think make up the communication pattern in this exercise?
(Offer, acknowledge/accept offer, confirm/thank)
2. Where would you find those same components within a guest engagement?
3. How did you react to having multiple balls added into the mix?
4. What skills did you need to use to be successful in this exercise?
5. How could you use (the skills identified by group) to help us better engage guests in conversations?