What's in Your Building with Biology Kit

June 21, 2016

Building with Biology

Hosts

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- Christina Leavell, Science Museum of Minnesota, St. Paul MN
- David Sittenfeld, Museum of Science, Boston MA

Building with Biology

Presentation Overview

Introduction to Building with Biology project

- Public Engagement
- Synthetic Biology
- Big Ideas

What's in the Box?

- Hands-on activities
- Forum
- Passports

Previous Events

- Pilot sites & Evaluation
- Examples
- Logistics

More information

Group Q & A, Discussion

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Public Engagement

Project Goals:

- Multi-directional conversations between scientists and the public

Target Audiences:

- Scientists and informal science educators, and the public

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Synthetic Biology

Biologists study life, specifically organisms and their relationship to their environment.

Engineers solve problems using science and math. They use an engineering design process, which is a series of steps towards solving a problem.

Synthetic biologists solve problems by applying engineering principles to biology

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Synthetic Biology

Researchers in this emerging field redesign existing organisms and make new ones.

Synthetic biology may provide solutions to problems in areas such as food security, healthcare, energy, and the environment.

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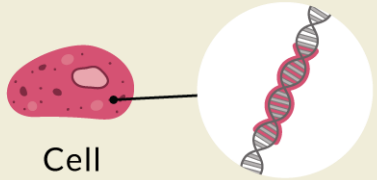
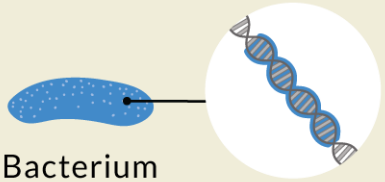
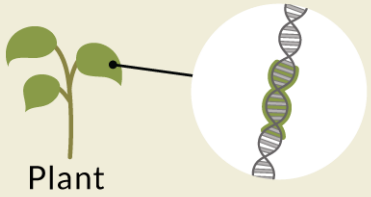
GENETIC PART #1



GENETIC PART #2

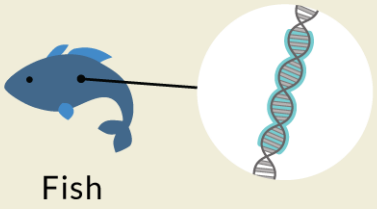


GENETIC PART #3



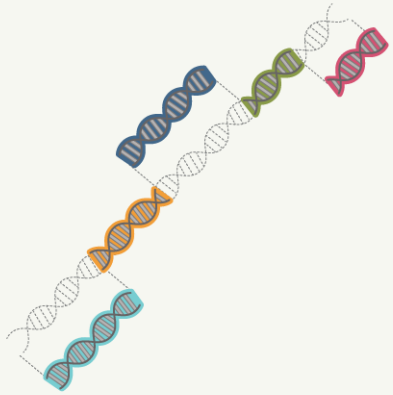
GENETIC PART #4

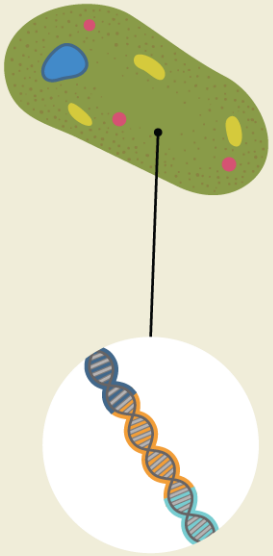
GENETIC PART #5



TOOLKIT OF GENETIC PARTS

Standardized parts with known functions





NEW OR MODIFIED LIVING ORGANISMS AND MATERIALS

Include genetic parts from different organisms

Big Ideas

Synthetic biology **builds biological systems**

Synthetic biology **generates new tools and knowledge**

Synthetic biology **benefits from many voices**

Synthetic biology **is interconnected with society**

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What's in the Kit?

Bio Bistro


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Activities and Conversations about Synthetic Biology
Bio Bistro
Decide what's on the menu!
Eat it
Think about it
No way
Coconut oil

Bio Bistro

Great group activity!

Very communal –everyone gets engaged

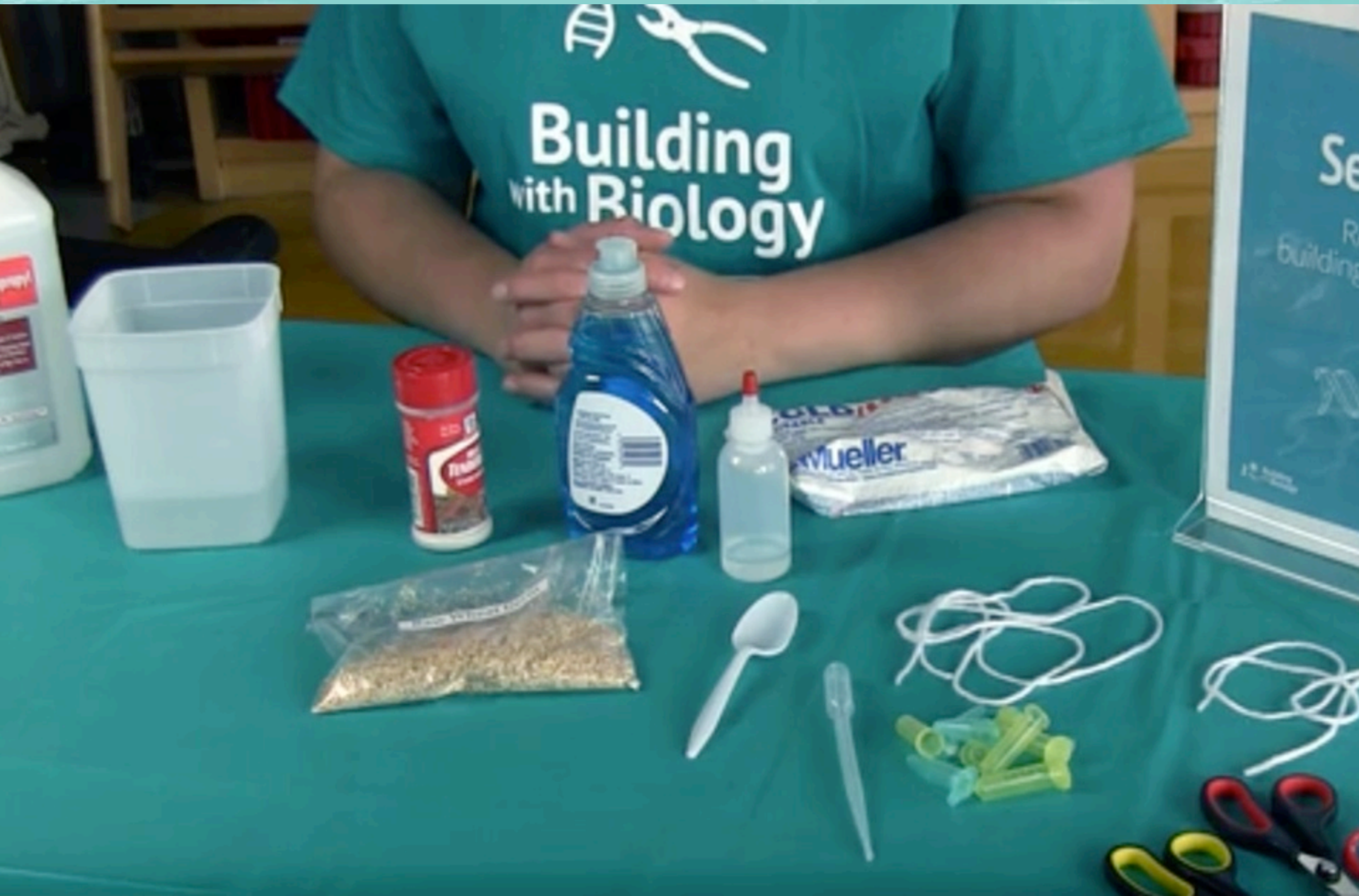
Kit of Parts


Building
with Biology
Treat malaria?
Treat cancer?
Make renewable plastic?
Locate environmental toxins?
Make synthetic biosensors?
TOOLKIT of BIOLOGICAL PARTS
MOVEMENT
SAFETY
PRODUCTION
Kit of Parts

Kit of Parts

Simple model – make sure public and scientists understand the shortcomings of this model

See DNA



See DNA

Advance prep necessary

Good entry point with fun take-away

Clean-up - do not clog your drains!!!

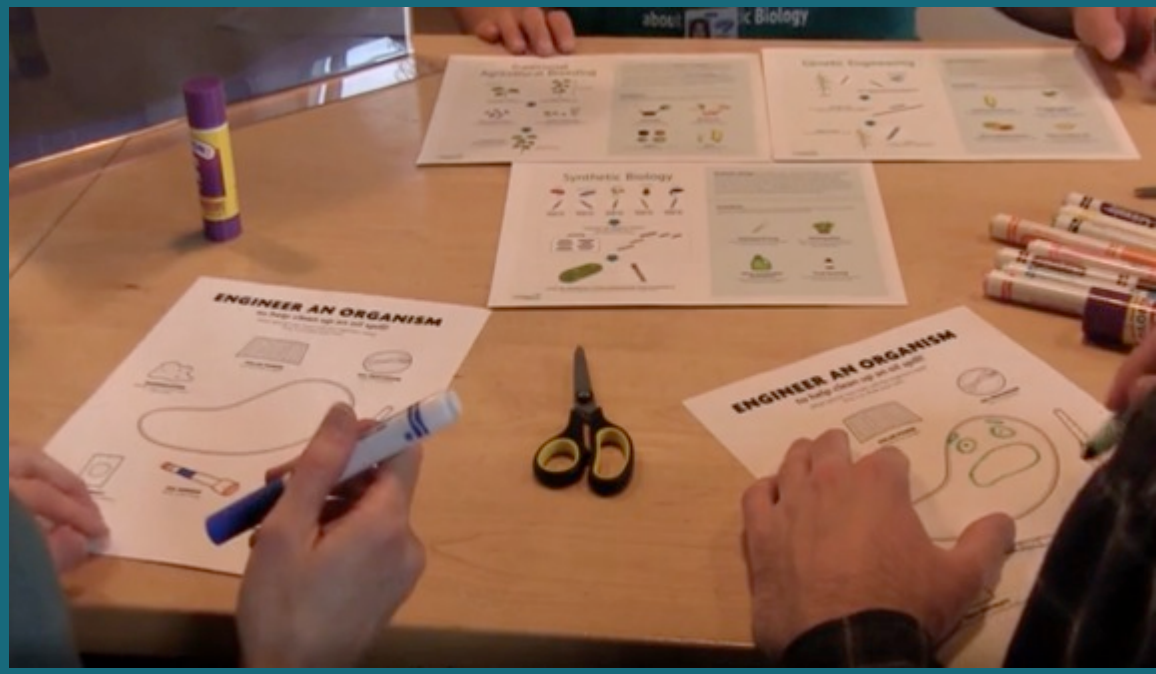
Super Organisms

Super Organisms

Steer clear of the super villains!

Unintended consequences

Super organisms are NOT like super heroes!



Tech Tokens

Tech Tokens

Many variations – group size, age, etc.

Just a few…

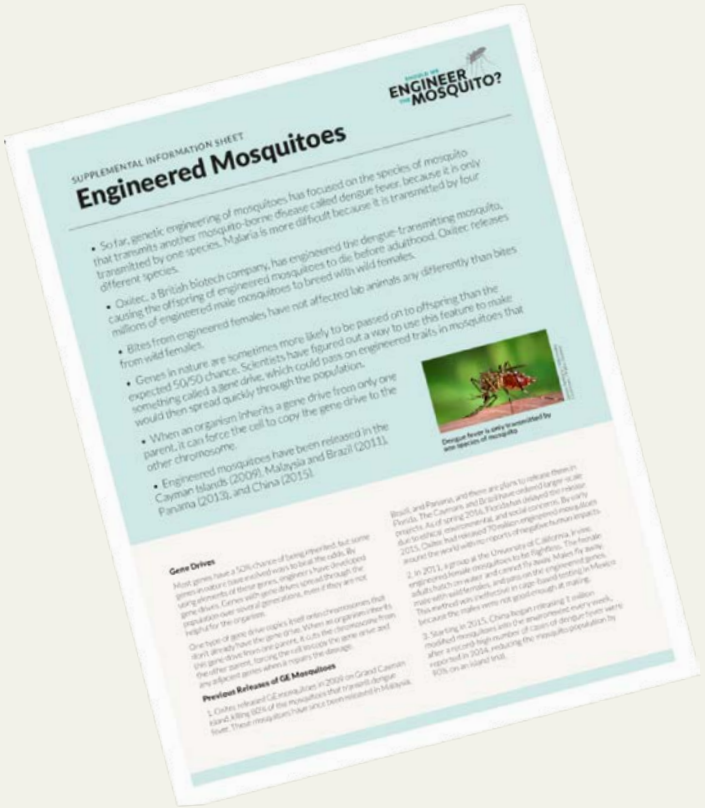
- **Limit cards**
- **Different color tokens for role/character card than personal choices**
- **Tokens = Wages on role/character cards**

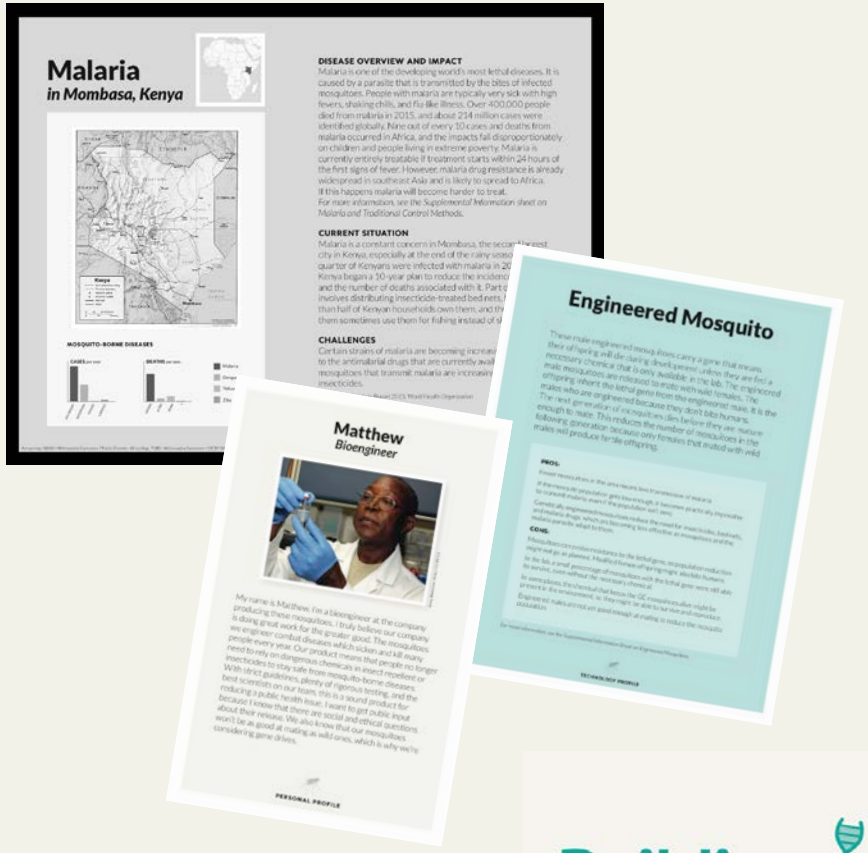
VirEx

VirEx ("FedEx" ;-)

Really tailor info to audience!

Forums





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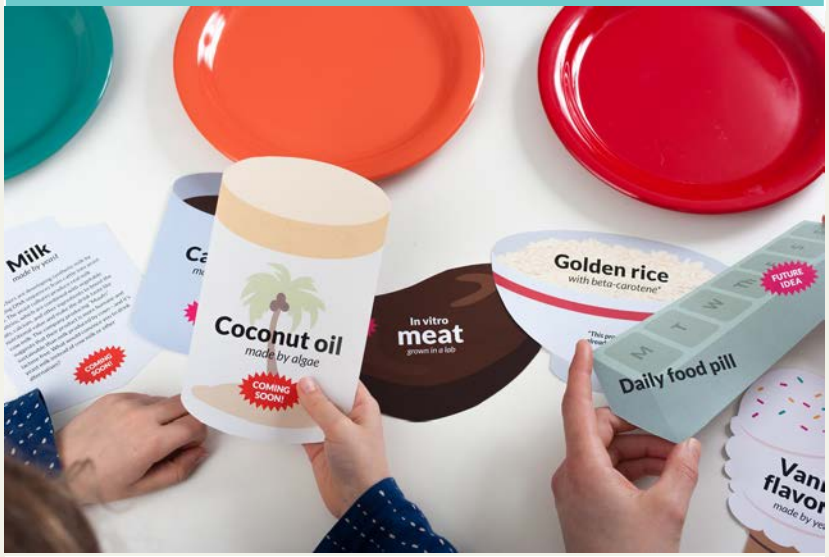
Hands-on activities



- Facilitated
- Shorter experiences + back-and- forth discussions

Forums

- Longer conversations
- Focus on societal and ethical issues
- Science content + personal experiences and values

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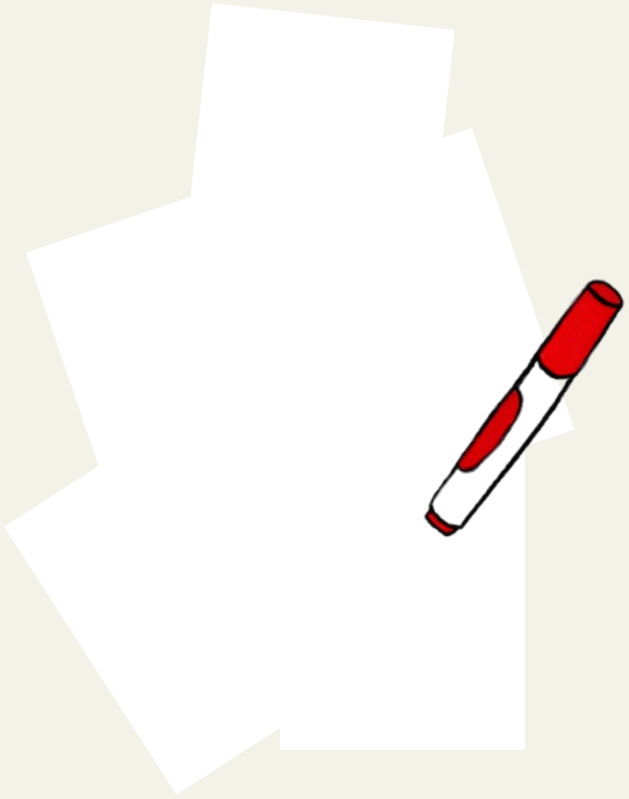
Passports & Graffiti Wall



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Training & Orientation Materials

The focus of this project is to encourage scientists and volunteers to engage in conversations with visitors.

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https://vimeopro.com/nisenet/buildingwithbiology

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Public understanding

Demonstration

- Scientist/educator has knowledge and expertise to share
- Visitors discover phenomena and laws of nature
- The facilitator communicates facts
- Visitors ask questions and receive answers

Public engagement

Conversation

- Everyone has their own values and perspective to share
- Visitors form opinions and explore ideas
- The group considers facts and values
- Facilitators and visitors ask questions and receive responses

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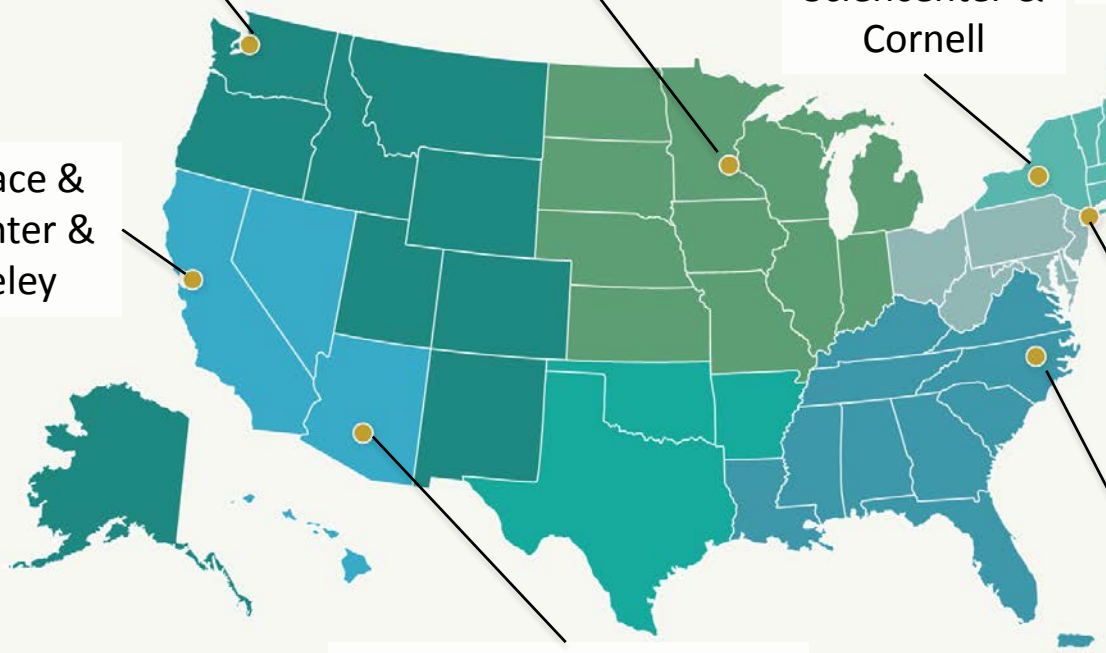
Pilot Events – Summer 2015



Pacific Science Center & University of Washington

Science Museum of Minnesota & University of Minnesota

Museum of Science & MIT

Sciencenter & Cornell

Chabot Space & Science Center & UC Berkeley

New York Hall of Science & GenSpace

Museum of Life and Science & North Carolina State University

Arizona Science Center & Arizona State University

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Evaluation Findings from Pilot Year

During the pilot events, we conducted surveys and found that:

- Visitors enjoyed the events
- Participating in events increased visitors' interest in synthetic biology
- Volunteers increased their skills in engaging the public in science

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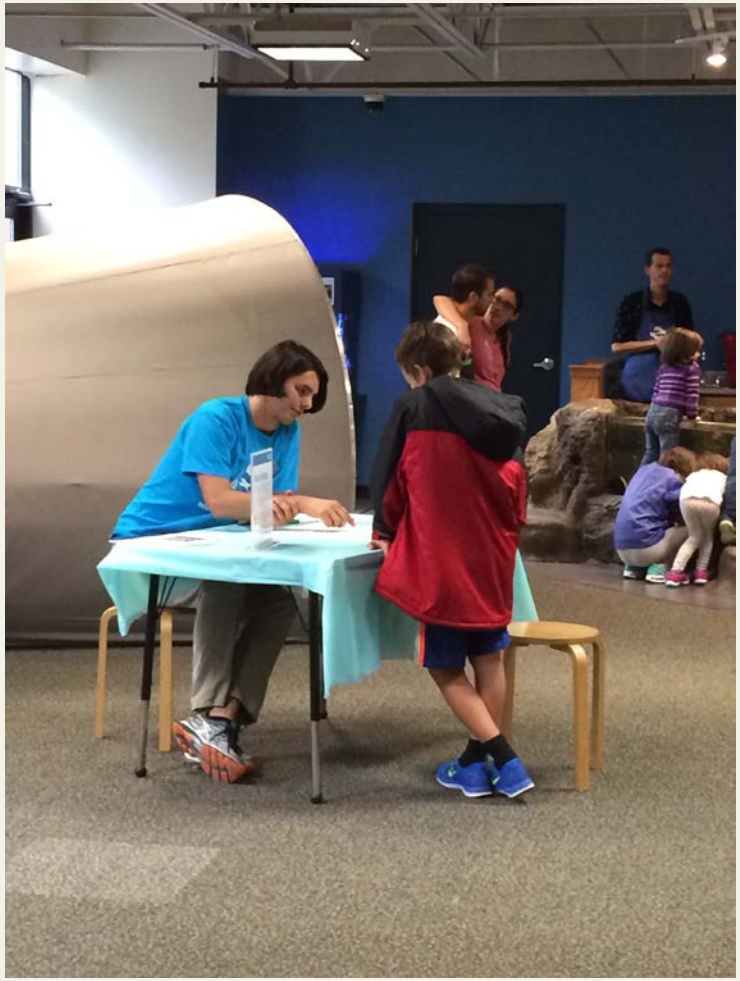
Sciencenter



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Scientist Orientations

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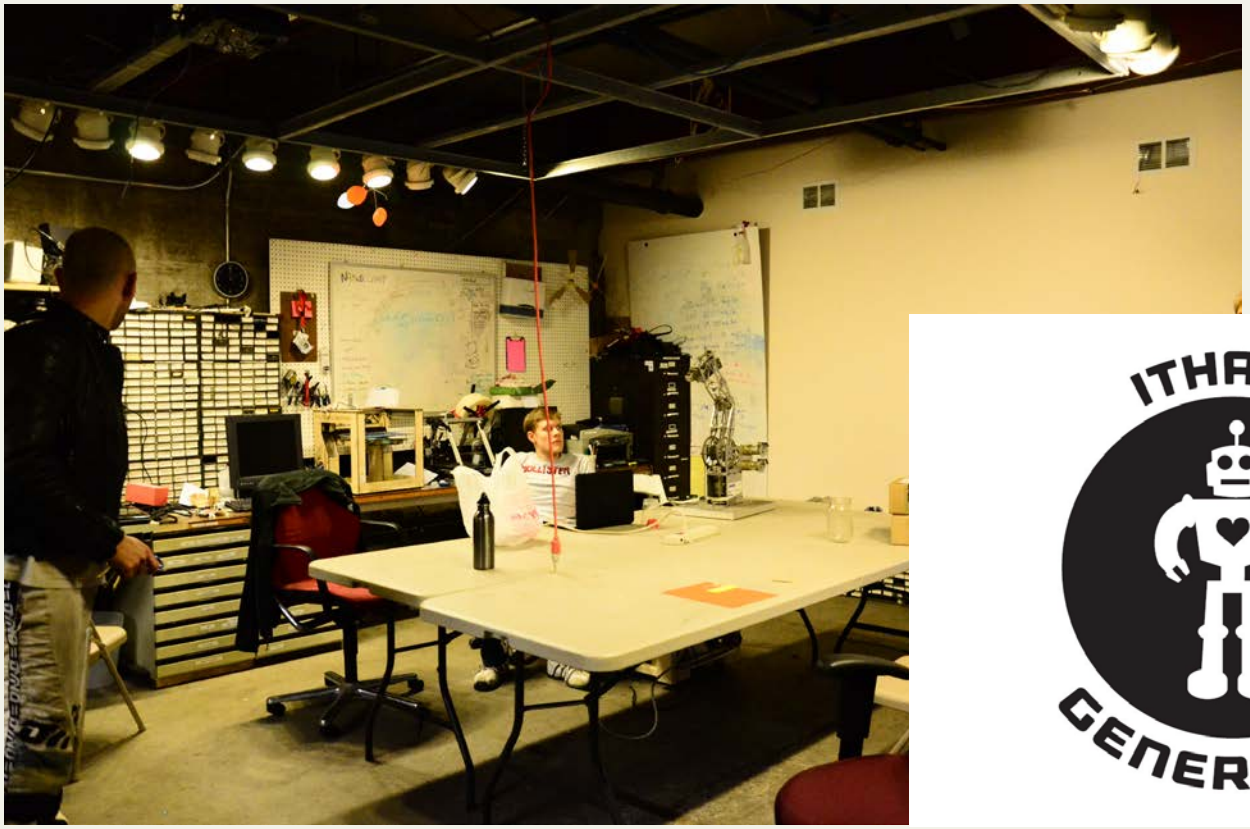
Forum



ITHACA GENERATOR

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Science Museum of Minnesota

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Museum of Science

Scientist Orientations

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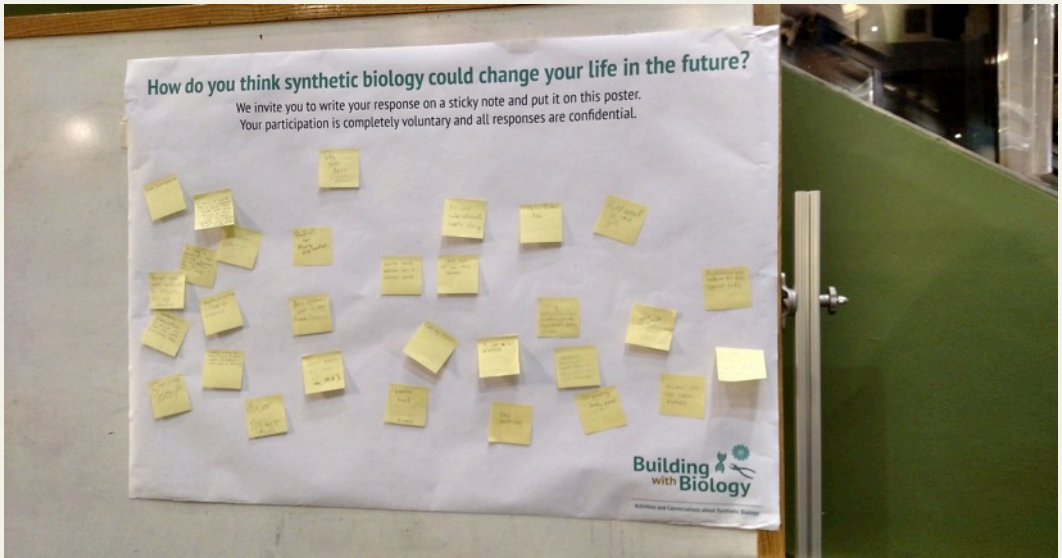
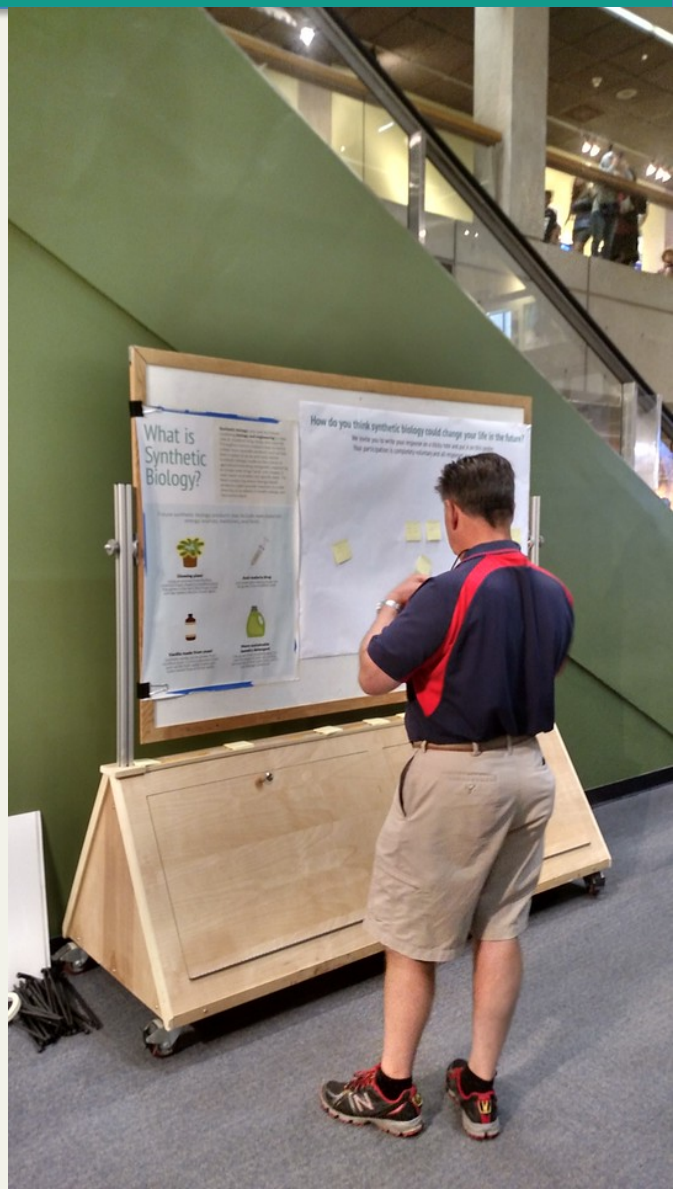
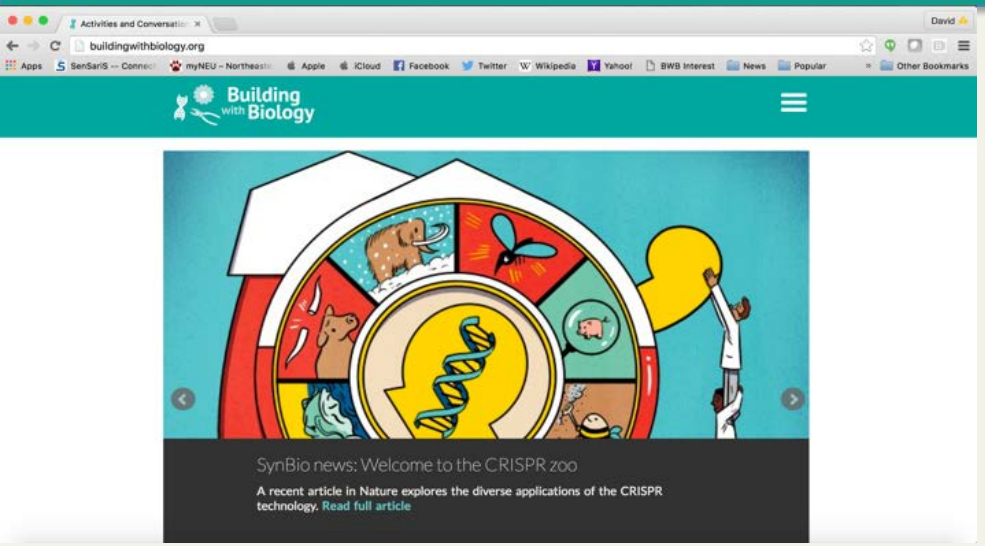
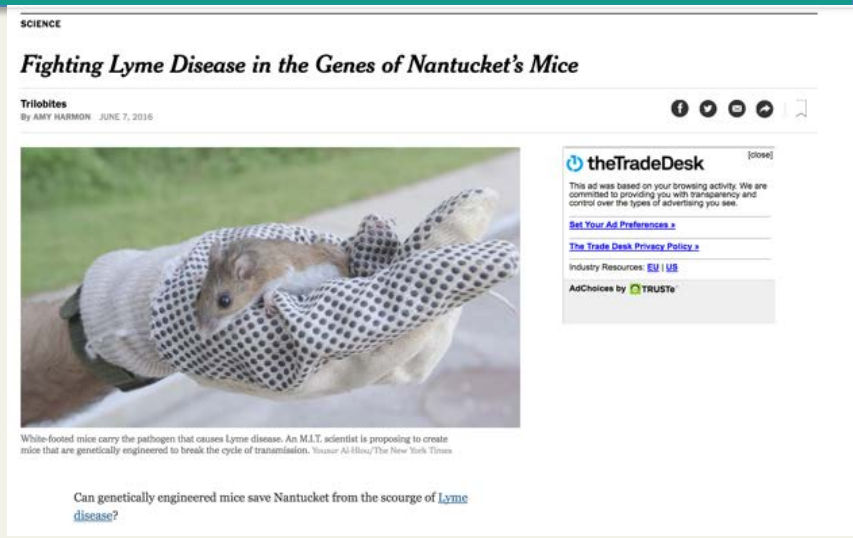
Research and Evaluation





Current Synbio Content





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Thanks

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NATIONAL INFORMAL STEM EDUCATION

We couldn't do this without you!

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