

DISCOVER



LET'S MAKE A DIFFERENCE

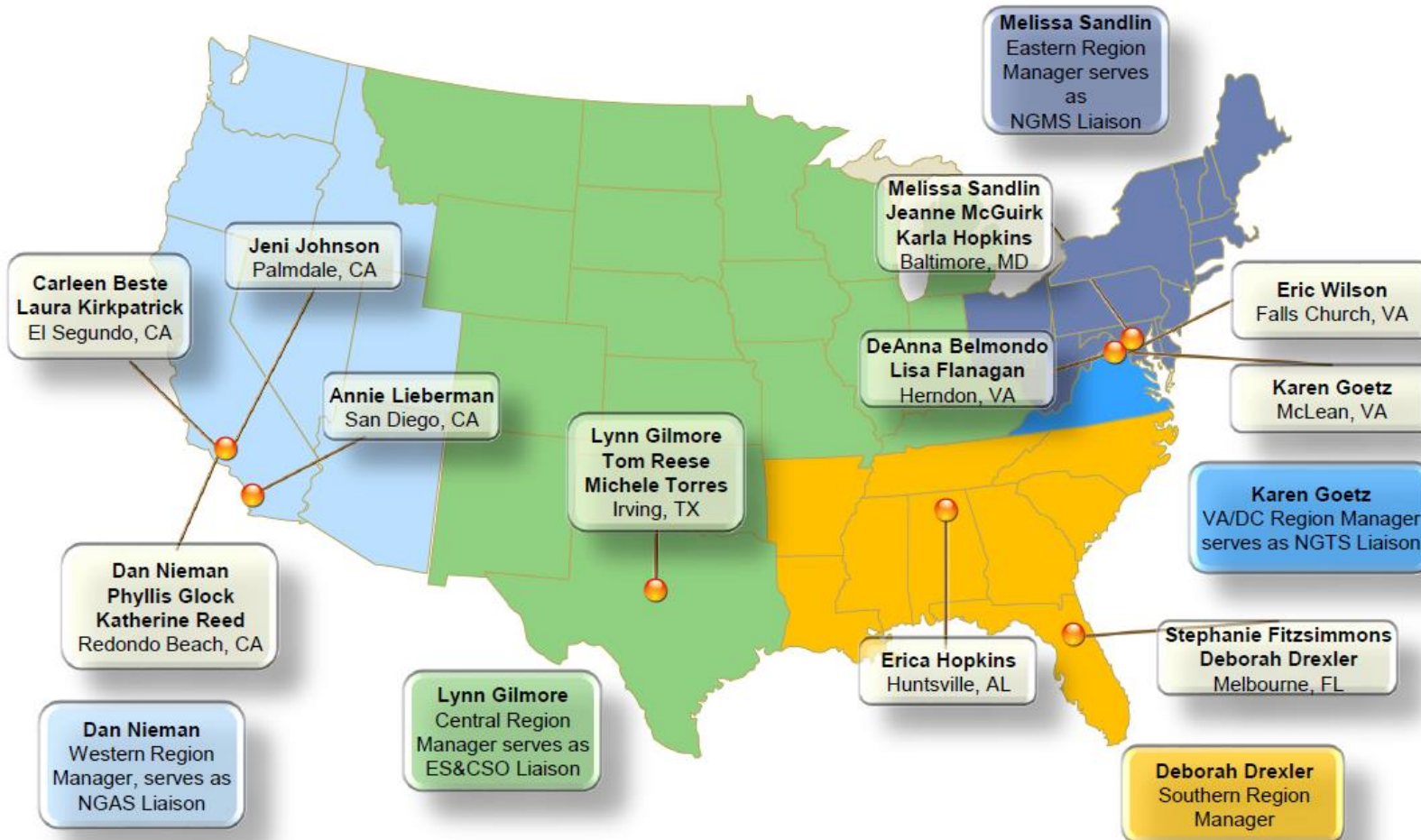
ENGINEERING IS FOR GIRLS

A DiscoverE webinar for Northrop Grumman

- Vision
 - Connecting our passions and talents to build partnerships that transform our communities
- Mission
 - Leverage our time, talent and dollars to cultivate a future workforce and strengthen the lives of those within our communities
- Strategic Priorities

Education Contribute to the development of a pipeline of diverse talent by supporting STEM and strategic education programs and initiatives that align to the business needs of the company	Employee Engagement Connect employees to strategic and impactful opportunities in the areas of volunteerism, skills development and community giving to create a culture that drives excellence and supports employee retention
Reputation Enhance Northrop Grumman's position as an employer and business of choice through key partnerships in our communities	Strengthening Communities Define and address the needs in our communities that align with our business and focus areas

The Northrop Grumman Corporate Citizenship Team



Corporate

Carleen Beste
2980 Fairview Park Drive
Falls Church, VA 22042
carleen.beste@ngc.com

Northrop Grumman Foundation

Carleen Beste
2980 Fairview Park Drive
Falls Church, VA 22042
carleen.beste@ngc.com

Employee Giving (ECHO) and Volunteerism

Eric Wilson
2980 Fairview Park Drive
Falls Church, VA 22042
e.wilson@ngc.com

Virginia / Washington, D.C. Region NGTS liaison

Karen Goetz
Karen.goetz@ngc.com
7575 Colshire Drive
McLean, VA 22102

Eastern Region NGMS Liaison

Melissa Sandlin
Melissa.sandlin@ngc.com
P.O. Box 17319
Baltimore, MD 21203-7319

Central Region ES&CSO Liaison

Lynn Gilmore
Lynn.gilmore@ngc.com
8710 Freeport Parkway, Suite 180
Irving, TX 75063

Western Region NGAS Liaison

Dan Nieman
Dan.nieman@ngc.com
One Space Park Dr,
E2/3017
Redondo Beach, CA 90278

Southern Region

Deb Drexler
deb.drexler@ngc.com
2000 W. NASA Blvd
Melbourne, FL 32904

K-12 STEM Education

Stephanie Fitzsimmons
Stephanie.fitzsimmons@ngc.com
2000 W. NASA Blvd, Melbourne, FL 32904



Presenter: Thea Sahr
Director of Communications and Programs

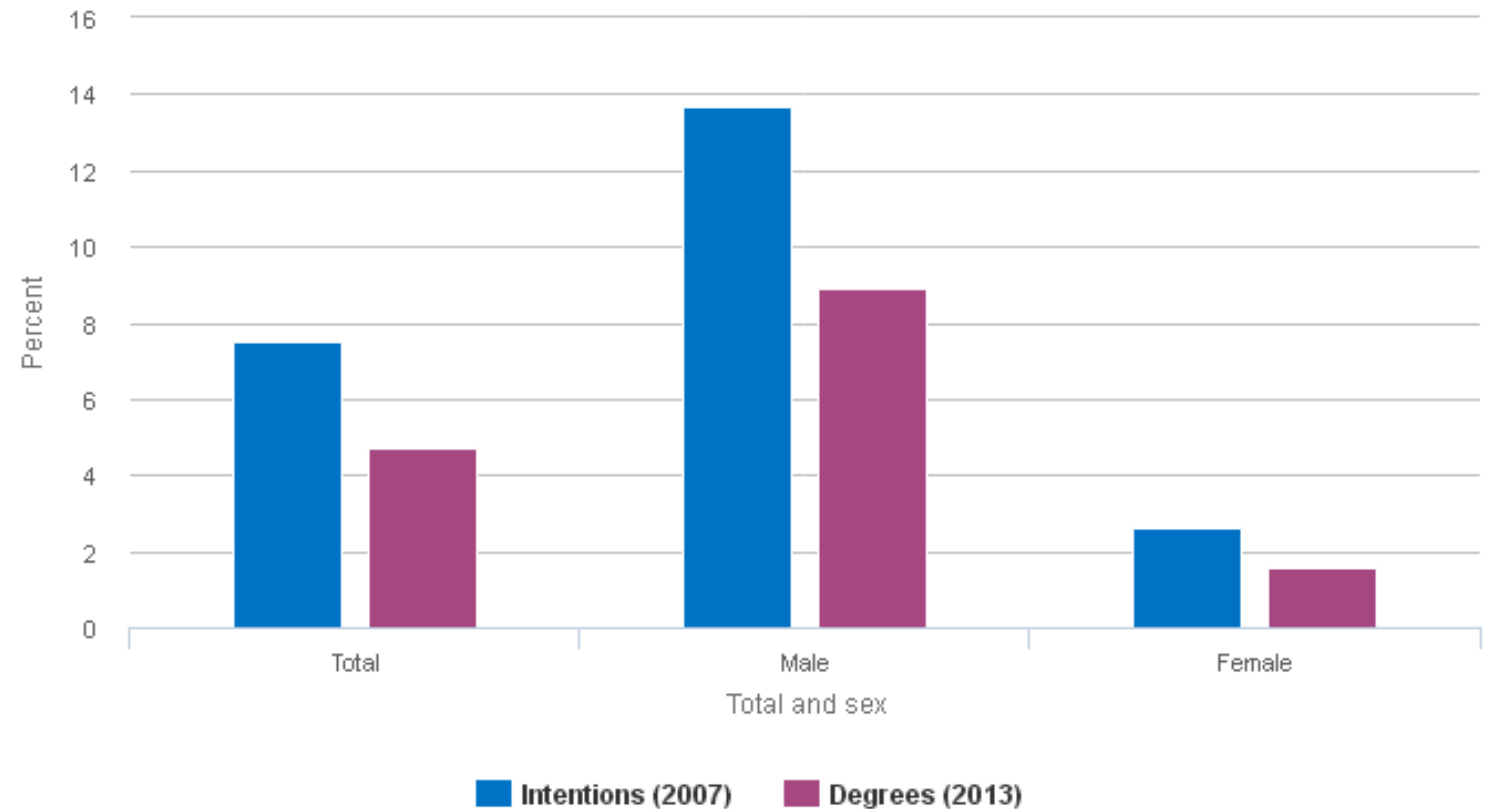
Webinar Goals

- The Issues
- What Girls Think About Engineering
- Effective Messages
- Hands-on Activities
- Being a Role Model

ENGINEERING IS FOR GIRLS

The Issues

Figure 2-11
Engineering: Freshmen intentions and degrees, by sex

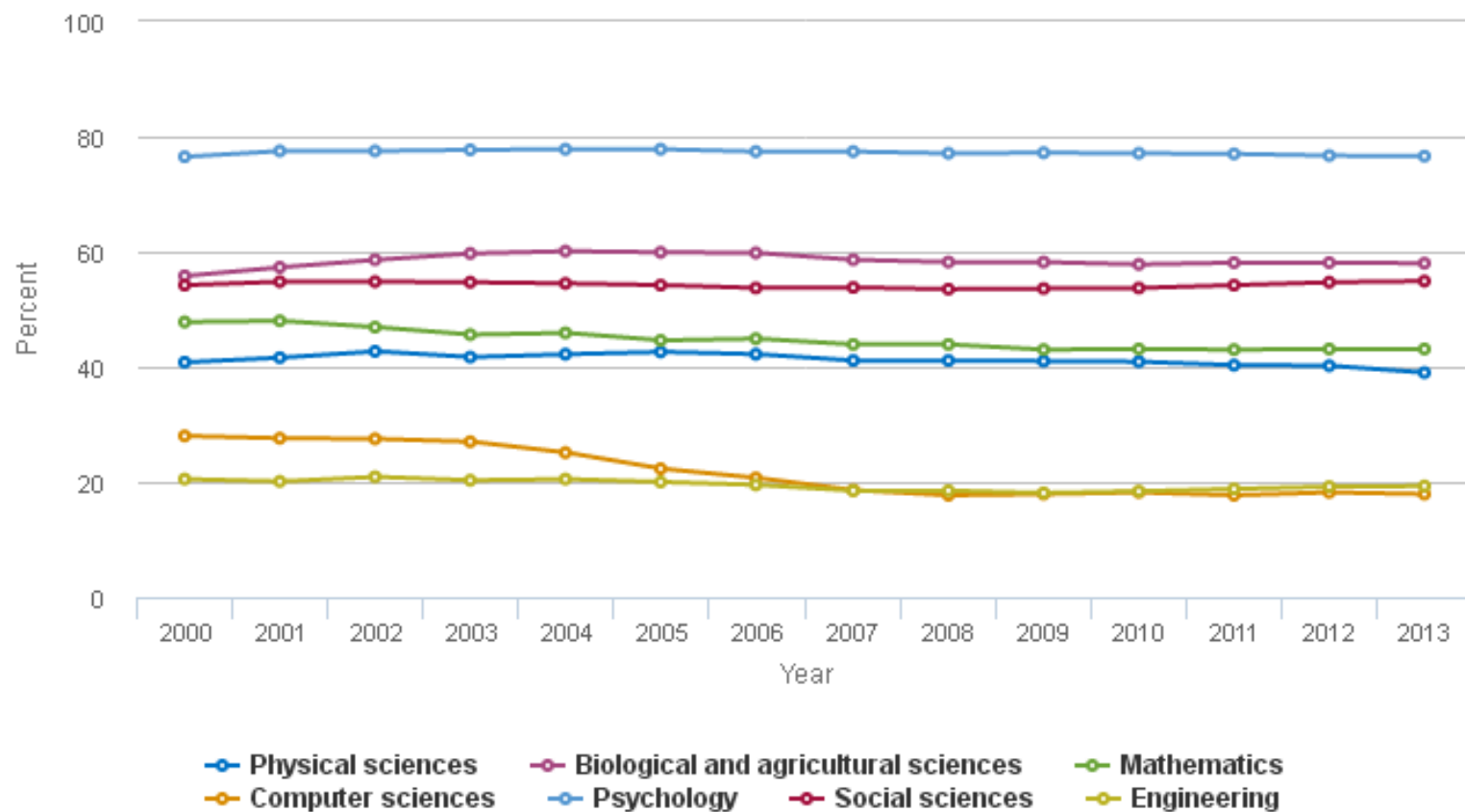


ENGINEERING IS FOR GIRLS

The Issues

Figure 2-16

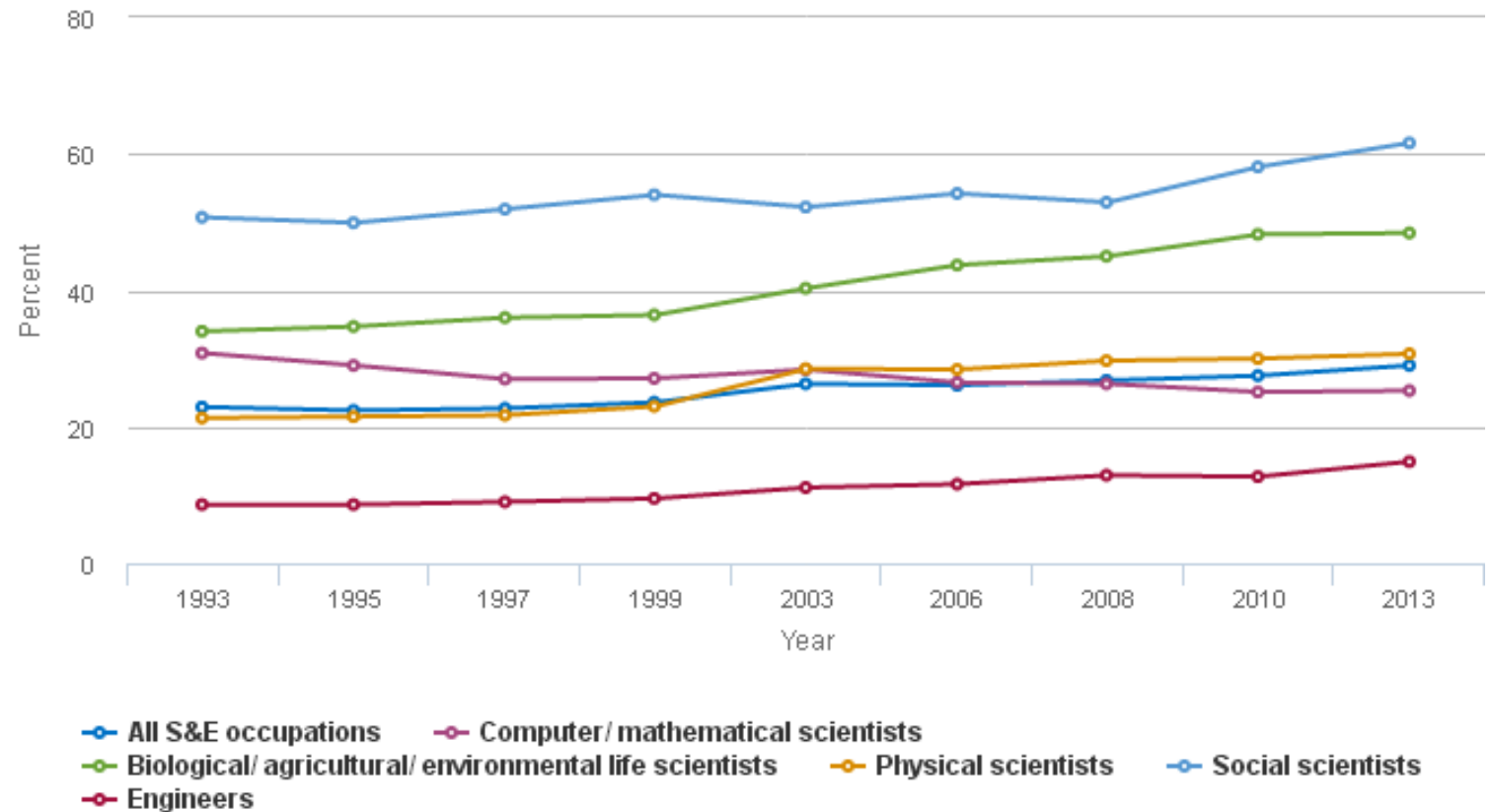
Women's share of S&E bachelor's degrees, by field: 2000–13



ENGINEERING IS FOR GIRLS

The Issues

Figure 3-28
Women in S&E occupations: 1993–2013



Why It Matters

The Employment & Competitiveness Problem

- Looming retirement bubble.
- Need for 'home grown' workers.
- Overall production of U.S. engineers compared with competitor nations/regions.
- Attrition out of engineering programs.
- Need more diversity—women and under-represented groups.

Why aren't more girls choosing engineering?

Here are some “*theories*”:

- Girls aren't interested
- They can't do math and science as well as boys
- They are opting out of careers that utilize 'hard science'
- They have more career options



What if we told you it's because**they don't know what engineering is?**

What do High School Girls Think?

- Engineering is for people who **LOVE** both math and science
- Don't know what engineering is
- Aren't interested in the field nor do they think it's for them

*"Someone who excels in math and science...
Someone who is motivated, dedicated, and doesn't
mind sitting in a cubicle all day."*



What High School Girls Want

Enjoyable

“How happy I will be—what’s the point of doing anything you don’t like?”

Good working environment

“If I can’t interact with people...I will probably drop the job.”

To make a difference

“That I would make a difference in some way, you know, make my mark on the world.”

Income

“As shallow as it sounds, money is the one thing I have to consider when I’m choosing a job. I’m not going to do something that I know can’t help me pay bills.”

Flexibility

“My career can’t consume all of my time...I need free time to do a lot of other things...before I die.”

What Engineers Tell Young People

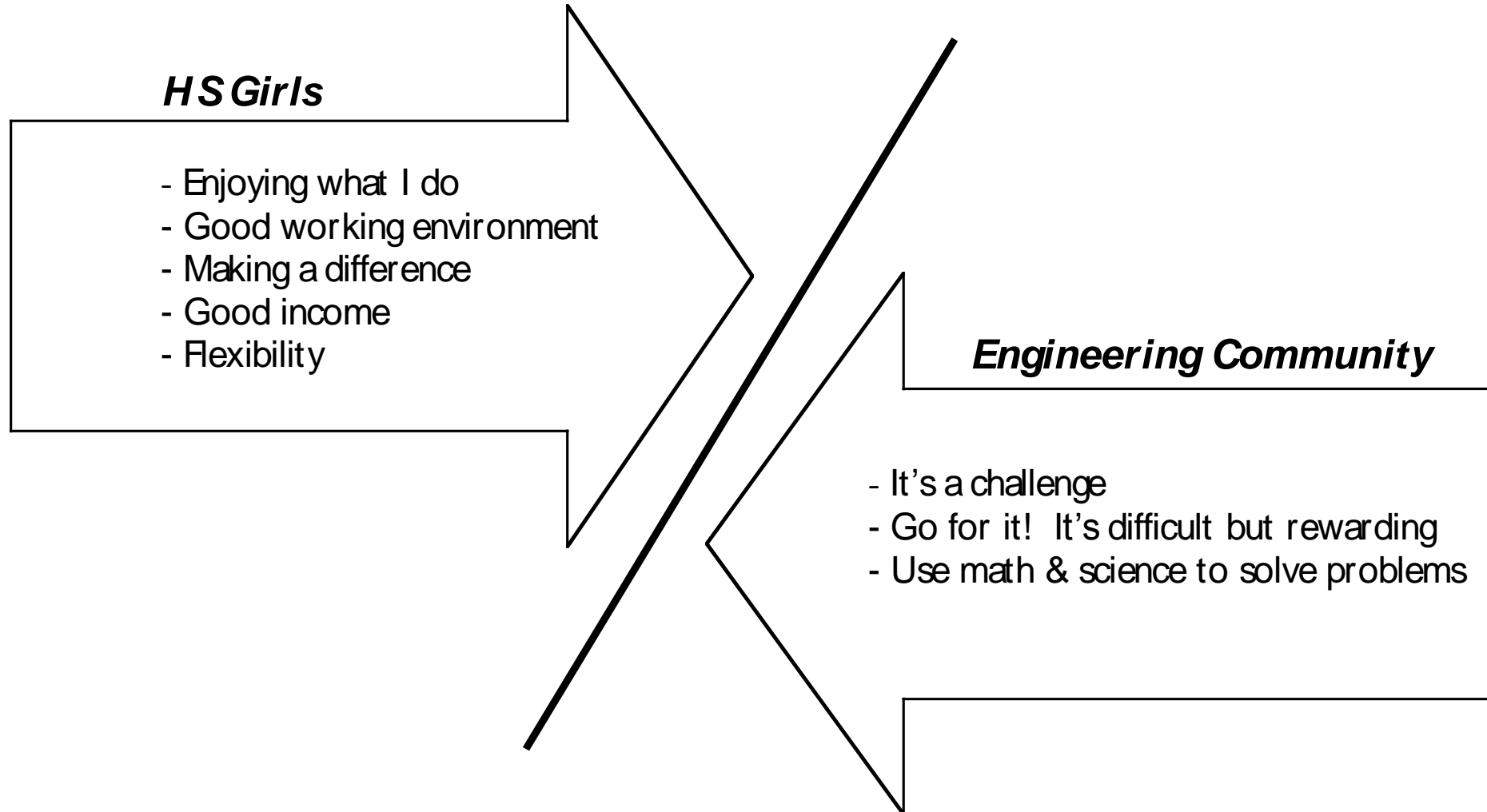
- Engineering is stressful and challenging
- They stress the importance of **SUPERIOR** math and science abilities

“It’s not easy—but if you’re the type who when faced with a problem some would call impossible is even more driven to move mountains to find a solution, then you might have it in you to be an engineer.”

Poll Question

1. Have you heard engineers say this to a young person?
2. Have you said this to a young person interested in engineering?

Disconnect



Effective Messages

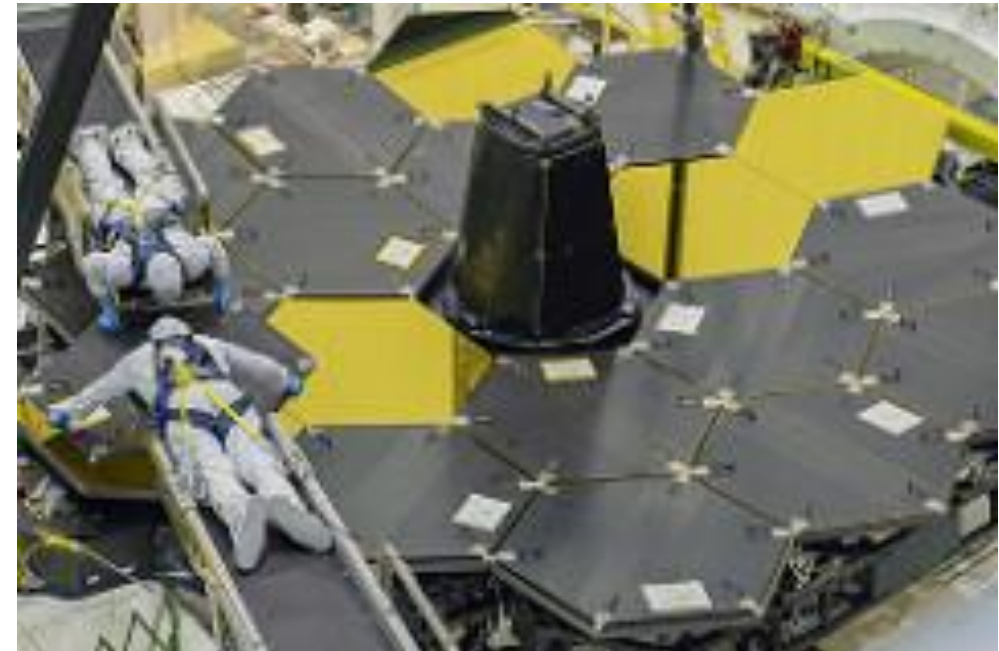


We need to focus our messages on how **creative, collaborative, lucrative, and flexible** a engineering career can be to attract more girls to the field.

Messaging Example: Into the Unknown

New Movie: The Making of the James Webb Telescope


- Outreach
- Activities
- Short videos



A close-up shot of a woman with dark hair, smiling broadly. She is wearing a white lab coat over a light-colored shirt. In the background, there are shelves filled with books and laboratory equipment, including a desk lamp and some colorful blocks.

1

**ENGINEERING
IS CREATIVE.**



2

**ENGINEERING
IS ABOUT
TEAMWORK.**



3

**ENGINEERS
MAKE A
DIFFERENCE.**

Adjusting the Engineering Image

- ~~‘Nerdy, geeky and boring’~~
- Provide engineering **role models** that look and sound like them
- Use words to describe engineering like **discovery, design, imagination, innovation, contribution**
- Use the word **create**, not build



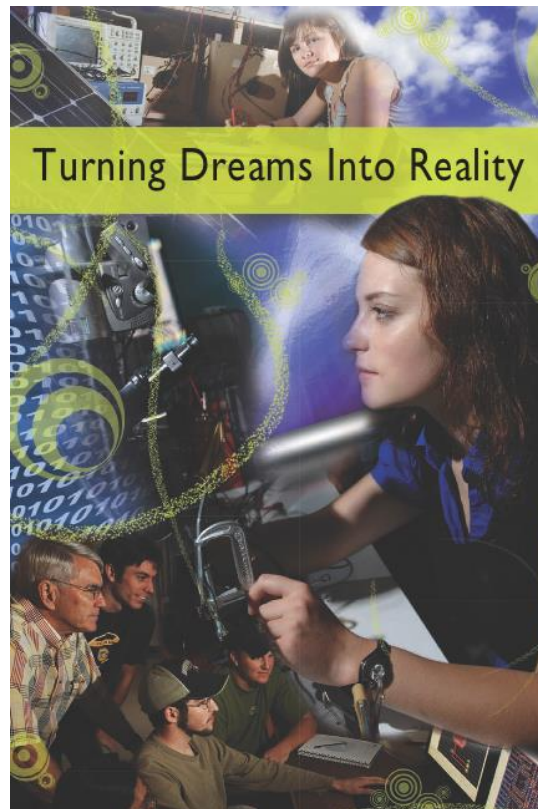
**ENGINEERING
IS FOR GIRLS**

Adjusting the Engineering image

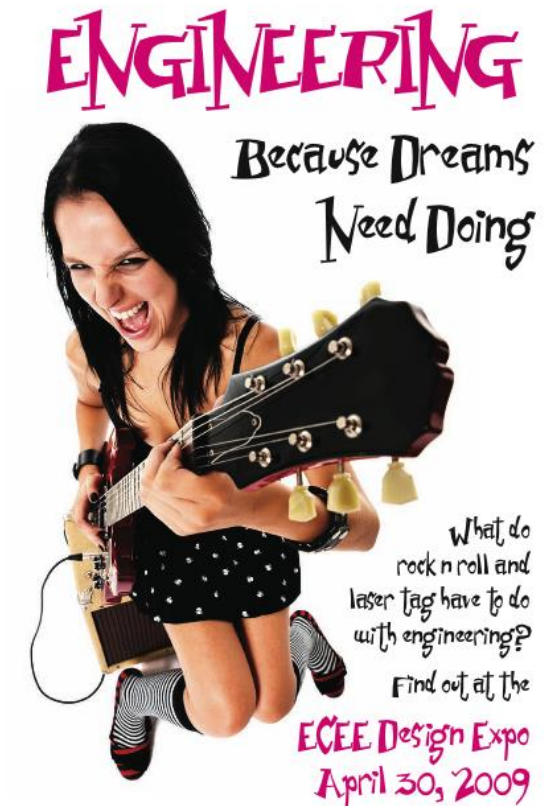
Use **images of people**:

- Girls tend to gravitate toward image of people and female engineers
- Boys more likely to pick images that features “things”

Poll: Which Poster is More Effective?



A



B

Take Away: Stop Focusing Engineering Inputs

- It's not about being good at math and science.
- It's about:
 - Teamwork
 - Making a difference
 - Creativity



ROLE MODELS

What's An Engineer?

Engineers are changing the world all of the time. They dream up creative practical solutions and work with other smart, inspiring people to invent, design, and create things that matter.

Successful Interaction

$$\begin{aligned} & \text{Positive engineering messages} \\ + & \text{Personal \& informal} \\ & \text{Hands-on activities} \\ \hline = & \text{a successful outreach experience} \end{aligned}$$

The Messages

Engineering is...

- Creative
- Team Oriented
- Making a Difference

Successful Interaction

$$\begin{aligned} & \text{Positive engineering messages} \\ + & \text{Personal \& informal} \\ & \text{Hands-on activities} \\ \hline = & \text{a successful outreach experience} \end{aligned}$$

Your Introduction

- Make it personal
- Use kid-friendly language
- Share academic and/or career path
- Share challenges and triumphs
- Show how engineers can change the world

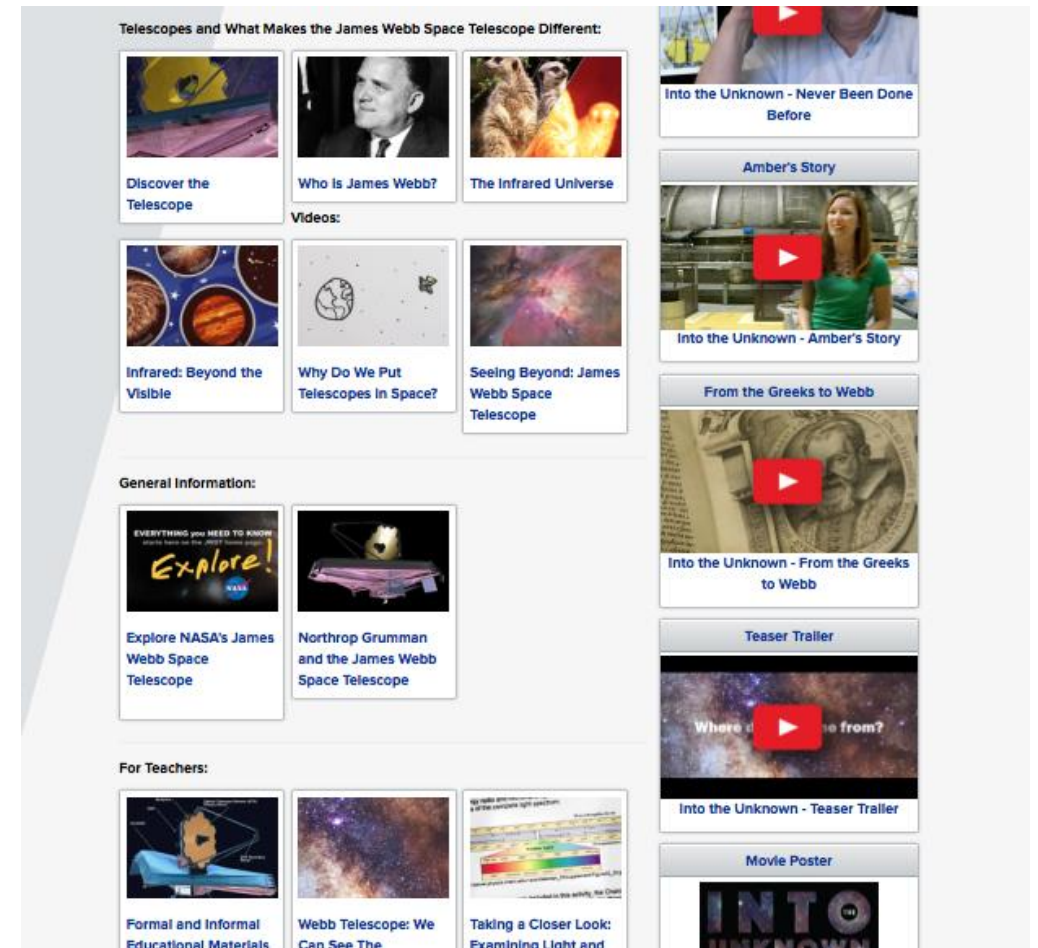
Successful Interaction

$$\begin{aligned} & \text{Positive engineering messages} \\ + & \text{Personal \& informal} \\ & \text{Hands-on activities} \\ \hline = & \text{a successful outreach experience} \end{aligned}$$

Finding Activities

www.northropgrumman.com/IntoTheUnknown


- Streaming Video
- Background Information
- Teacher Resources
- Student Resources



Finding Activities

DiscoverE.org

- Updated Activity Library
 - 125 Activities
- Videos & Partner Websites
- 2 new Discover Engineering Sections




[Our Programs](#)[Discover Engineering](#)[Online Training](#)[Cool Content & Activities](#)[Resources & Downloads](#)[About Us](#)[Our Shop](#)


Cool Content & Activities

[Hands-On Activities](#) [Aerospace](#) [Clear all filters](#)


Showing 15 result(s).




Launch It
Design and build an air-powered rocket that can hit a target.




Touch Down
Design and build a shock-absorbing system to protect two marshmallow astronauts when they land.




Rocket Challenge
Make an Alka-Seltzer rocket and launch it to hit a target.



Lego Structures
Create a recognizable building out of whatever materials you get—in 12 minutes or less.



Balloon Flinker
See if you can make a balloon flink--neither float away nor sink!



Design a Folding Solar Panel
Design a solar panel that can be folded up and expanded without tearing.

Filter by

- ☒ All Activities

Activity Type

- ☒ Hands-on Activities
- ☐ Videos
- ☐ Trips & Destinations
- ☐ Websites
- ☐ Games
- ☐ Lesson Plans

Discipline

- ☒ Aerospace
- ☐ Agricultural & Biological
- ☐ Bioengineering & Biomedical
- ☐ Material Science
- ☐ Chemical
- ☐ Civil
- ☐ Computer
- ☐ Electrical
- ☐ Environmental



THE ACTIVITY

Choosing Activities

- It is a demo or hands-on?
- Is there a purpose?
- Does it follow the Design Process?
- Can you weave in the messages?

TOUCH DOWN ACTIVITY

The Challenge

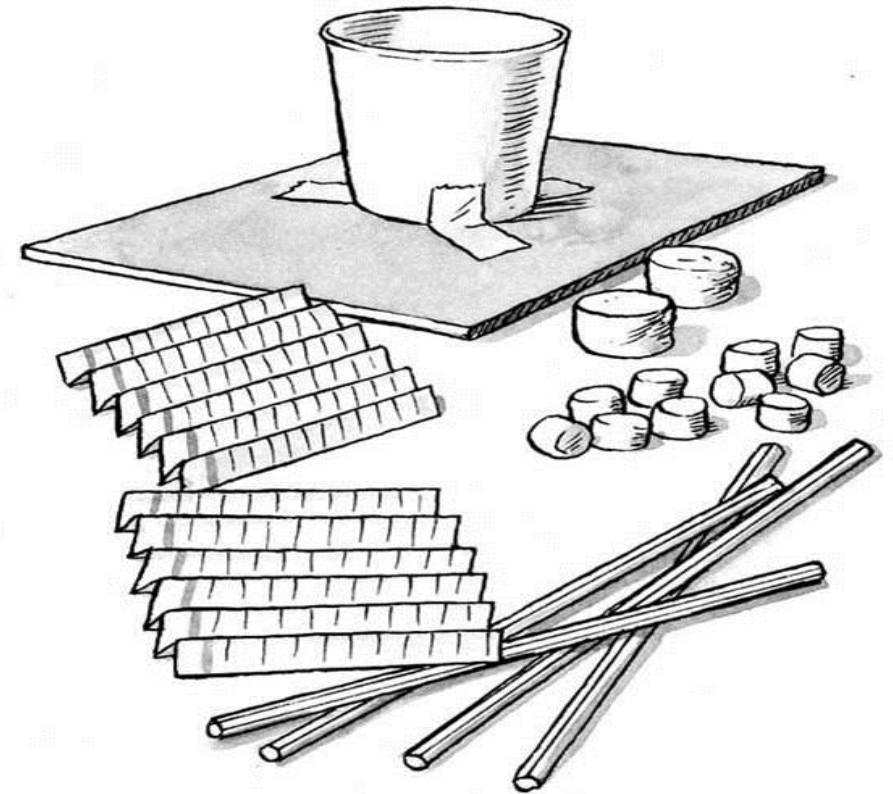
Design and build a system that will protect two “astronauts” when they land.

Introduce

- NASA Mission to the Moon
- LCROSS (Northrop built)

Brainstorm

- How can you help it land upright?
- What materials will help cushion the landing?



TOUCH DOWN ACTIVITY

Build

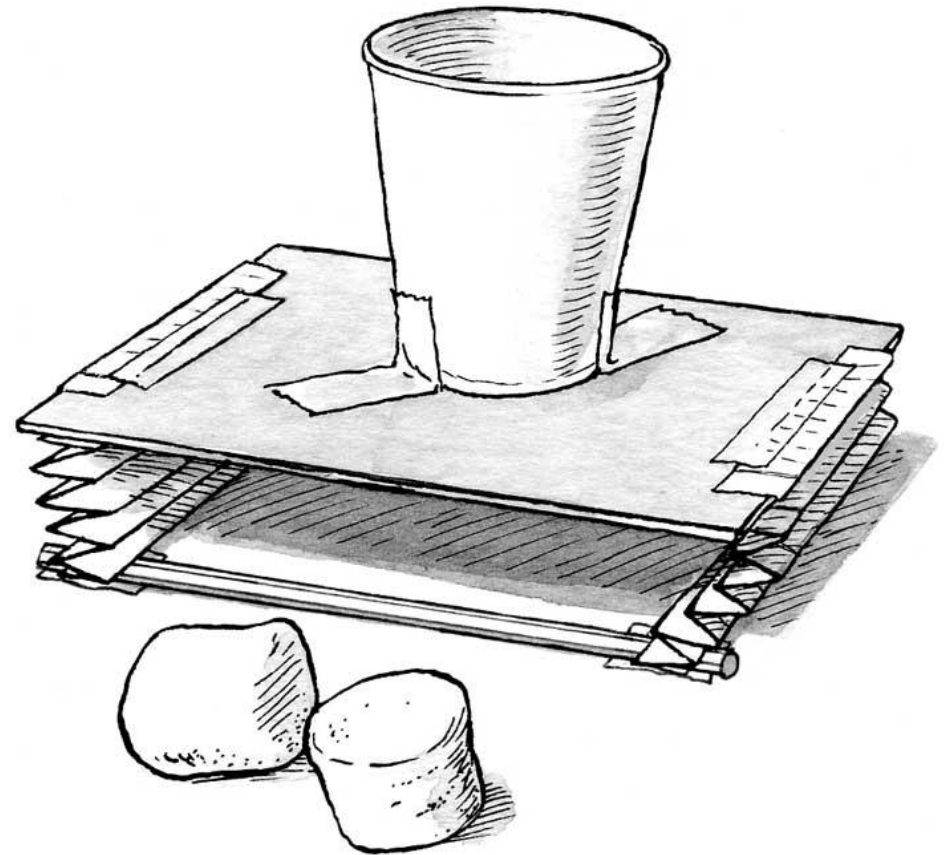
Build shock-absorbers that will protect the “astronauts” upon impact.

Test

Use it repeatedly.

Redesign

- What changes did you make?
- What did you learn from others?



TOUCH DOWN ACTIVITY

Materials

- Stiff Paper
- Cardboard
- Paper or plastic cup
- Index cards
- Marshmallows
- Rubber bands
- Straws
- Scissors
- Tape



TOUCH DOWN

DESIGN CHALLENGE

Design and build a shock-absorbing system for a spacecraft to protect two marshmallow astronauts when they land. The astronauts should not fall out when the craft is dropped from a height of 1 foot.

SUPPLIES AND EQUIPMENT

Per whole group

- Scissors
- 100 index cards
- 100 rubber bands
- 100 straws
- Sponge or foam pieces

Per team

- 1 piece of cardboard, 4" x 5"
- 1 paper cup
- 1 roll transparent or masking tape
- 2 marshmallows

GETTING READY

Cut the cardboard into pieces approximately 4" wide by 5" long.

INTRODUCTION

How do you protect an astronaut from being crushed by the forces of lift-off?

NASA spacecraft require shock-absorbing devices. Rockets shake violently as they launch and landers touch down on places like the Moon or Mars with a great deal of force. Without shock absorbers, these extreme vibrations on launch would shake the astronauts with a force 5-6 times stronger than Earth's gravity or destroy the delicate equipment in the landers when they reached these places in the solar system.



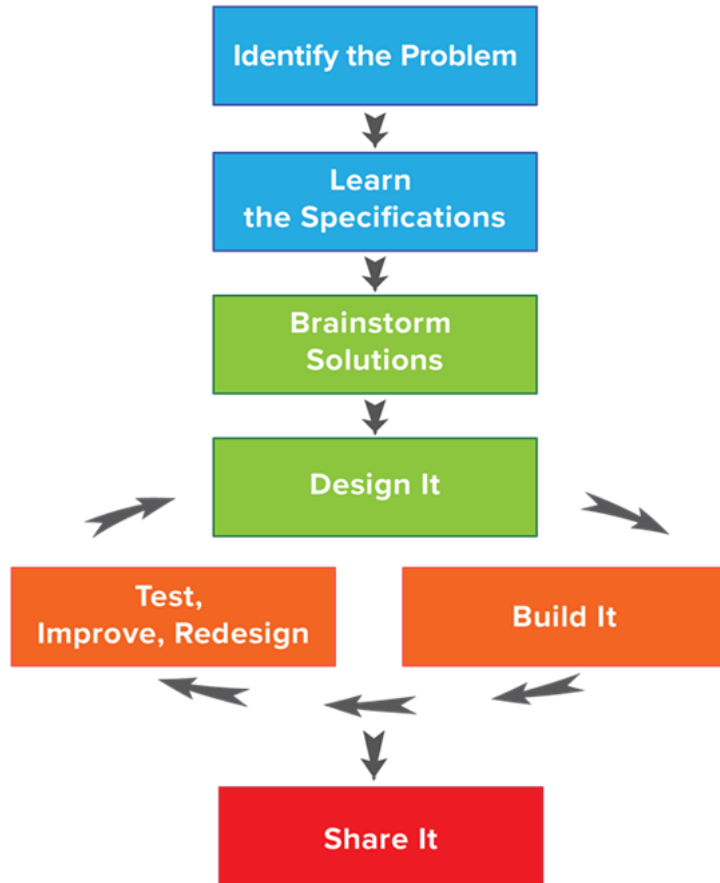


THE ACTIVITY

TouchDown Activity

- ✓ It is hands-on
- ✓ Purpose
- ✓ Design Process
- ✓ Messages

The Design Process



- Use the engineering design process.
- Emphasize the value of brainstorming and exploration, rather than right and wrong
- Promotes Growth Mindset

Fixed Mindset	Growth Mindset
Intelligence is static.	Intelligence can be developed.
Leads to a desire to <i>look smart</i> and therefore a tendency to	Leads to a desire to <i>learn</i> and therefore a tendency to
• avoid challenges	• embrace challenges
• give up easily due to obstacles	• persist despite obstacles
• see effort as fruitless	• see effort as path to mastery
• ignore useful feedback	• learn from criticism
• be threatened by others' success	• be inspired by others' success

Facilitating an Activity

- Ask leading questions rather than telling them what to do
- Start with where, why, how might you
- Praise children for effort.
- Highlight the struggle.

Successful Interaction

$$\begin{aligned} & \text{Positive engineering messages} \\ + & \text{Personal \& informal} \\ & \text{Hands-on activities} \\ \hline = & \text{a successful outreach experience} \end{aligned}$$

Wait, there's more!

- Global Marathon, March 8 & 9th
 - Register at:
DiscoverE.org/GlobalMarathon
- Global Day of the Engineer
 - April 5th
 - Take the Pledge:
DiscoverE.org/GlobalDay