S SCIENCE

T TECHNOLOGY

E ENGINEERING

M MATHEMATICS

STEM CENTERS OF INNOVATION

SPACE REDESIGN GUIDE

BOYS & GIRLS CLUBS OF AMERICA

Raytheon

TABLE OF CONTENTS

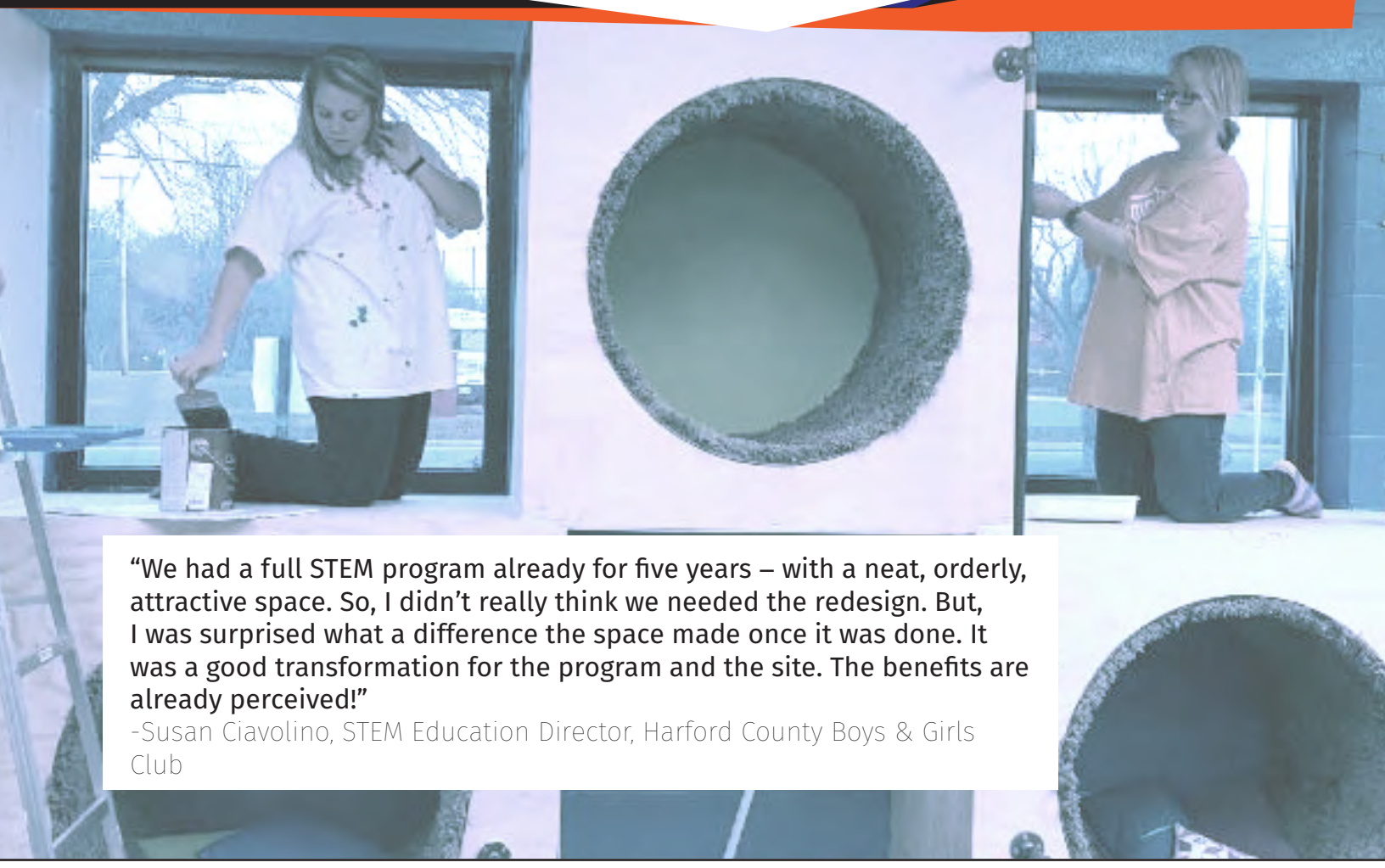
STEM CENTER OF INNOVATION

(stem | senter | uhv | in-uh-**vey**-shun)

noun

Flexible, youth-friendly space that stimulates creative thinking and hands-on project making, using diverse materials and modern technology.

+ Beautifully designed Club makerspaces foster creativity in an informal, project-driven atmosphere.
+ A place for members to use all their senses as they explore emerging technologies in a workshop-based laboratory.



"We had a full STEM program already for five years – with a neat, orderly, attractive space. So, I didn't really think we needed the redesign. But, I was surprised what a difference the space made once it was done. It was a good transformation for the program and the site. The benefits are already perceived!"

-Susan Ciavolino, STEM Education Director, Harford County Boys & Girls Club

PREPARE

5 LIST YOUR IDEAS

As you collect information, inspiration and motivation... don't forget to jot things down along the way. Then you can organize your thoughts and present them at your Club's Design Charrette.

4 TALK TO EXPERTS

Your Club already has a network of professionals with a variety of skill-sets. Tap into those contacts for specialized advice. Who knows, they may even volunteer their time and resources toward your cause!

3 BROWSE THE INTERNET

Type '**STEM Educational Resources**' into your browser's search bar, and embark down a rabbit hole of information and designs. Or simply click on a few of our favorites below.

MAKER ED | **TINKERING** | **SPARK!LAB**

2 VISIT LOCAL STEM CENTERS & MAKER SPACES

A simple Internet search for STEM Educational Centers in your city will yield vast results: from local libraries, to universities, to after-school programs. Visit a few locations in your area for inspiration and ideas.

1 REVIEW OUR RESOURCES

Everything STEM Activation Guide

BGCA's Great Think STEM

BGCA has a library of resources around STEM education, networking and setting up a program of your own. Simply click the icons to start browsing.

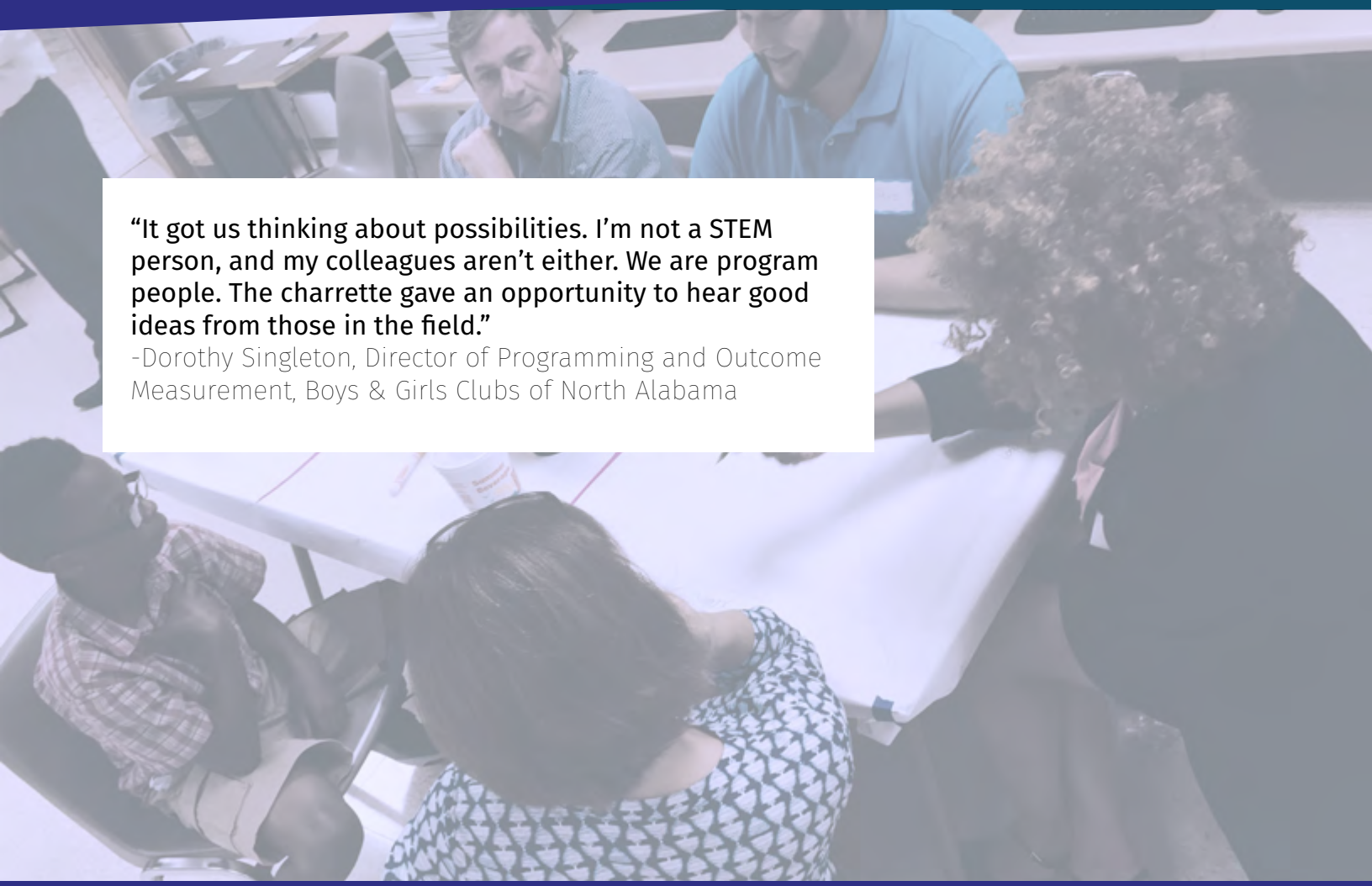
DESIGN CHARRETTE

(dih-zahyn | shur-**ret**)

noun

An intensive planning session where stakeholders and designers collaborate on a vision for development.

+ Provides a forum for ideas and offers the unique advantage of giving immediate feedback regarding design.
+ Allows all participants to be mutual authors of the plan.



"It got us thinking about possibilities. I'm not a STEM person, and my colleagues aren't either. We are program people. The charrette gave an opportunity to hear good ideas from those in the field."

-Dorothy Singleton, Director of Programming and Outcome Measurement, Boys & Girls Clubs of North Alabama

WHO, WHAT, WHERE, WHEN

WHO TO INVITE?

BGCA CLUB	**STAFF** BGCA Club / member knowledge	**MEMBERS** Aesthetics, feel and flow of room; desired programs; what's most important	**PARENTS** Diverse knowledge, unique interests
LOCAL AFFILIATES	**CLUB SUPPORT** Logistics, local educational needs, regulations	**CURRENT SPONSORS** Field knowledge, available resources, donations	
LOCAL AREA	**DESIGNERS** Creative ideas, budgeting tips, project plan	**CONSTRUCTION CONTRACTORS** Technical planning, budgeting, safety tips	**PROFESSIONALS / SPONSORS** General knowledge, donations / volunteer support

SAMPLE INVITE

STEM CENTERS OF INNOVATION

BOYS & GIRLS CLUBS OF AMERICA | Raytheon

YOU'RE INVITED!

Join us in designing our community's new STEM Center of Innovation.

Sept 1, 2016 | 4:00 – 6:30 p.m.

Future STEM Center of Innovation
Boys & Girls Club of Anywhere
1234 Club Terrace
Atlanta, GA 30319

We will engage our community's youth with a fun place to interact, create and discover emerging technologies, as a hands-on supplement to their STEM-based school curricula. Lend your unique perspective and expertise as we design the program, determine the atmosphere and layout of the space, and brainstorm unique materials and technologies for young people to enjoy.

Network with our community's educational professionals, local business leaders, designers and contractors, our youth and their parents as we collaborate in a fun, creative brainstorming session. **Refreshments will be served.**

Please RSVP to Mary Doe by August 15 at MaryDoe@bgca.org.

BUDGET

(buhj-it)

noun

+ A plan based on a pre-determined allotment of funds.
+ An itemized allowance of funds, time and resources toward a certain project.

verb

+ To plan according to fixed time and money constraints.
+ To work with what has been set aside.

"We spent a lot of our budget on construction. We wanted it done right. Keeping up with technology is always a challenge, and we didn't want to outgrow the space."
-Tiana Marratta, Operations, Boys & Girls Clubs of Central Texas

YOUR INVENTORY

Before determining what you don't have, think about what you already do have!

Consider the current space.

What work is needed to make the space function as a STEM Center? Will the current electrical system support the new technology and multiple work stations? Must walls be torn down? Is other demolition needed? Is the current flooring appropriate? Are windows or other outside access needed? Is there any unused space that could be converted (i.e., closet to be transformed into a recording studio)? What aesthetics are needed to make the space look and feel like a STEM Center?

Consider the current technologies and materials on hand.

Are adequate computers and software already available? Can any of the existing furnishings be used or re-purposed for the new space? Are any materials available that are not being used? Could local agencies be asked to offer their unneeded equipment for donation? What raw materials, both for the remodel and for stocking the STEM space, are already available, or could be requested for donation?

What in-house or local volunteer support is available?

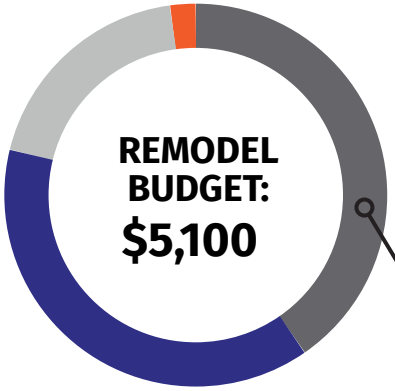
What talent already exists? Are there design, construction, or technology students or staff available who would like to lend their talents? Which local experts are eager to contribute pro-bono support? What furnishings can be built vs. purchased?

Expert Tip

For ideas on building your own furniture and repurposing other creative items, check out **Make Space.**

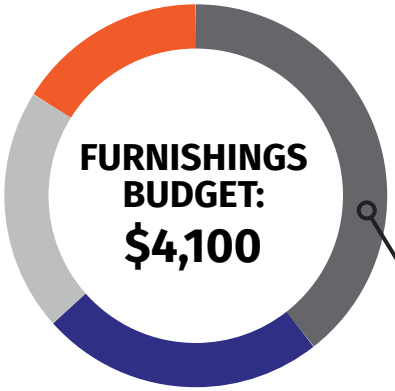
Make Space LINK

YOUR MONEY



- **Update Electrical** $2,000
- **Drywall Finishing** $2,000
- **Tear Out / Install Flooring** $1,000
- **Paint Walls and Trim** $100

Total $5,100

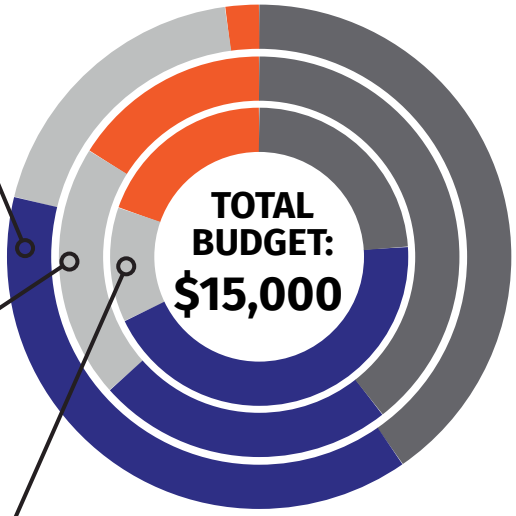


- **Rolling Chair x 16** $1,600
- **Whiteboard Table** $1,000
- **Whiteboard x 3** $900
- **Storage System x 2** $600

Total $4,100

- **iMac Workstation x 2** $1,430
- **10” Tablet x 10** $2,500
- **3D Printer** $1,240
- **Misc. Supplies** $630

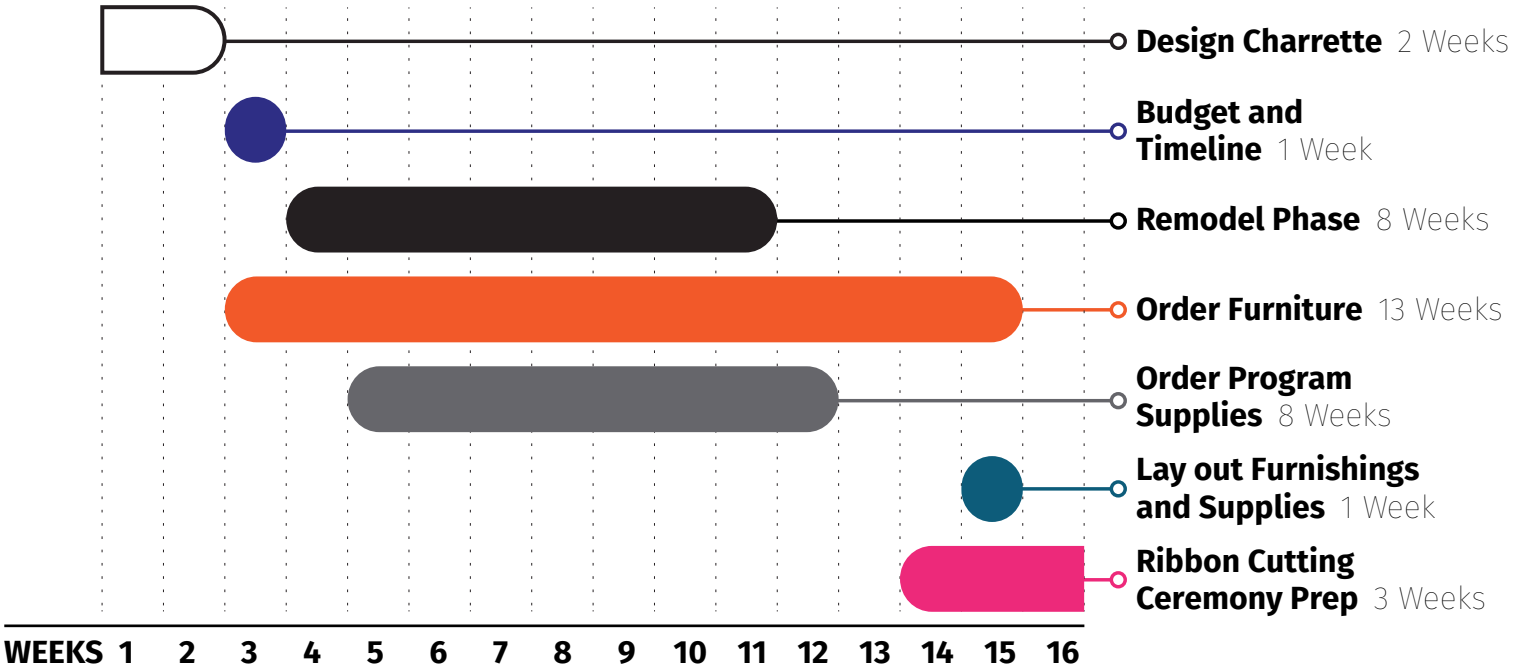
Total $5,800



YOUR TIME

"Keep everyone informed. You have to meet regularly to keep the renovation going. There are lots of moving parts."
-Tiana Marratta, Operations, Boys & Girls Clubs of Central Texas

SAMPLE TIMELINE



Expert Tip
Assign a project team with a project lead to oversee the entire process and keep the redesign moving forward. Utilize project management tracking tools like Excel, or cloud-based software like Google Drive or TeamGantt to track progress. The project team should meet regularly throughout the remodel timeframe.

DESIGN

(dih-**zahyn**)

noun

+ An outline, sketch or plan for a project.
+ The combination of details and features for a space.

verb

+ To plan and fashion artistically and skillfully.
+ To assign thought or intention toward a definite purpose.

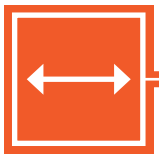
"Our members come to the Club after spending all day in class. We didn't want them just laying around playing on computers. We wanted a special space that was exciting for them to do more learning. We want them working on projects." The result? "They are happy, even though it's not just another Teen Center."

-Dorothy SIngleton, Director of Programming and Outcome Measurement, Boys & Girls Clubs of North Alabama

ELEMENTS

Bridging the Gap Between a Vision and a Reality

A space's **design** can greatly enhance the outcome of innovative **programs**. A successfully designed room can remove barriers and support the efforts of talented people, which greatly improves **member outcomes**. Simply stated: The right spaces make innovation work.



Imagine **wide open spaces** for members to collaborate, conduct research or informally present their work.

Create a **cozy corner** as a peaceful place to chill out by the window, in comfy chairs, over a rug, beside a shelf stocked with books to inspire making.

Bring in **natural light** and set a mood that is ambient, airy and aesthetically appealing. Make technology part of the built-in environment so it is accessible, but does not dominate the space.

To **stimulate** great ideas, show off your **accessible** materials in transparent containers that are easy to locate and keep the space organized.

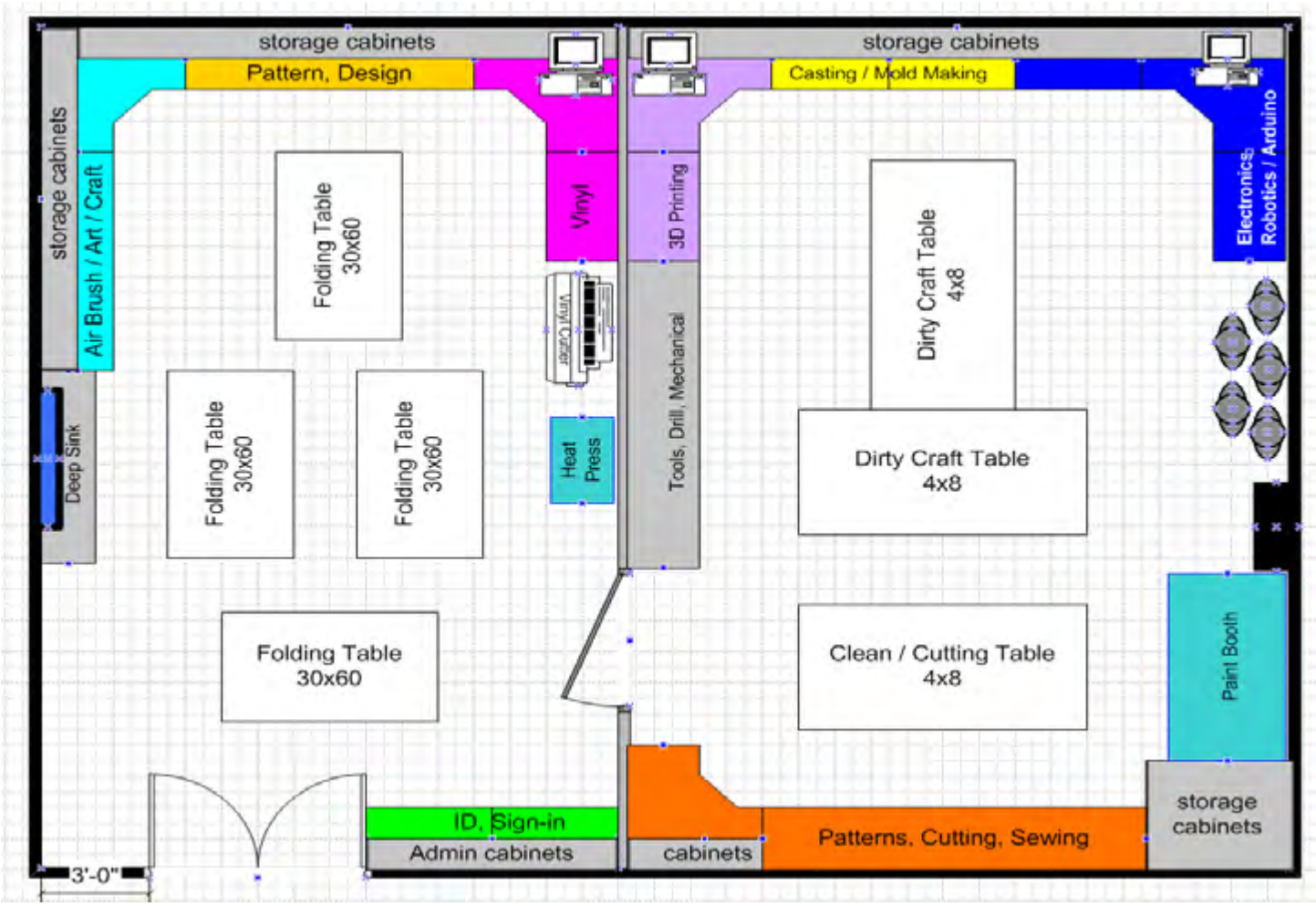
Changeable layouts with furniture on wheels and puzzle-piece tables can be **customized** for large groups, small groups, individual projects and everything in between.

Make your space **inspirational** to foster collaboration and conversation. Promote **relaxed interaction** and allow for quiet, reflective work. Add a unique design element that reflects your community and youth interests.

FLOOR PLAN

Really envision your completed space. Use what you know about the room's dimensions, intended layout, and furniture and supplies on order to create your own STEM Center of Innovation floor plan.

To learn how to create a floor plan using Excel, click on the floor plan below to visit an instructional video on YouTube. Or type in a browser: https://www.youtube.com/watch?v=M0lEQF1r45E



FLOOR PLAN

You can also hand draw your space to get started.

COLOR SPECTRUM

Color affects mood. Mood affects learning! From the walls, to the accents to the furniture and decorations...
The colors you choose matter!

Color helps to distinguish sections of a room for various purposes. **Experiment with color!** Throw pillows, furniture and decorations should include splashes of color to illicit the intended mood.

Calming, **neutral tones** are best for large areas, like walls and floors, as they promote relaxation and a comfortable sense of well-being. While **blue** and **green** best tap into these temperaments, too many **bright colors**, like **orange** and **red**, can have the opposite effect – leading to overstimulation and stress. Yet in **small quantities**, brighter colors can elicit a lively, positive, energetic atmosphere where members are stimulated to collaborate and try new things.

Expert Tip
To learn more about color and its effect on a child's mood and learning, check out these great resources:

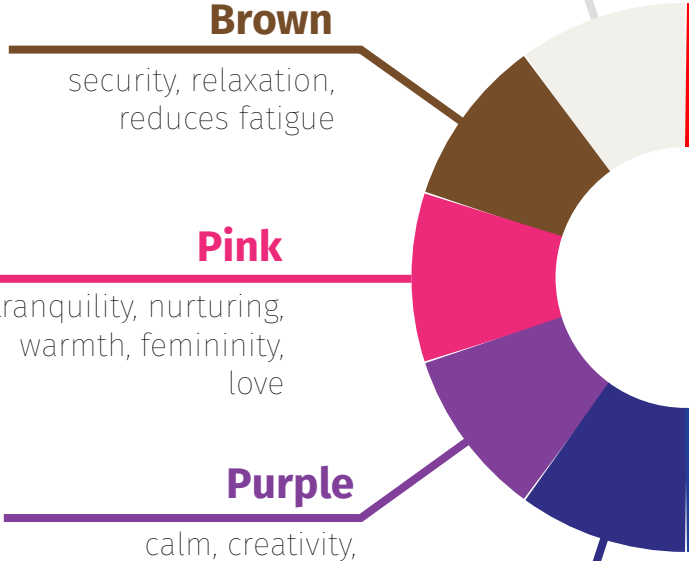
SMITH SYSTEM SITE

START SMART BOOK

E-LEARNING SITE

COLOR SPECTRUM

The Science of Color



Off-White
maintains attention, positive

Red
alertness, excitement, creativity, determination

Brown
security, relaxation, reduces fatigue

Orange
stimulates alertness

Pink
tranquility, nurturing, warmth, femininity, love

Yellow
lively, energetic, positive, maintains attention, promotes creativity

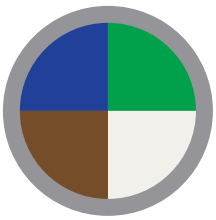
Purple
calm, creativity, imagination

Green
calmness, cleanness, peace, growth, health, nature

Indigo
structure, idealism, intuition, wisdom

Blue
relaxation, well-being, happiness, peace, communication, strength, masculinity

Maker Zone **Chill Zone** **Study Zone**



SUPPLY

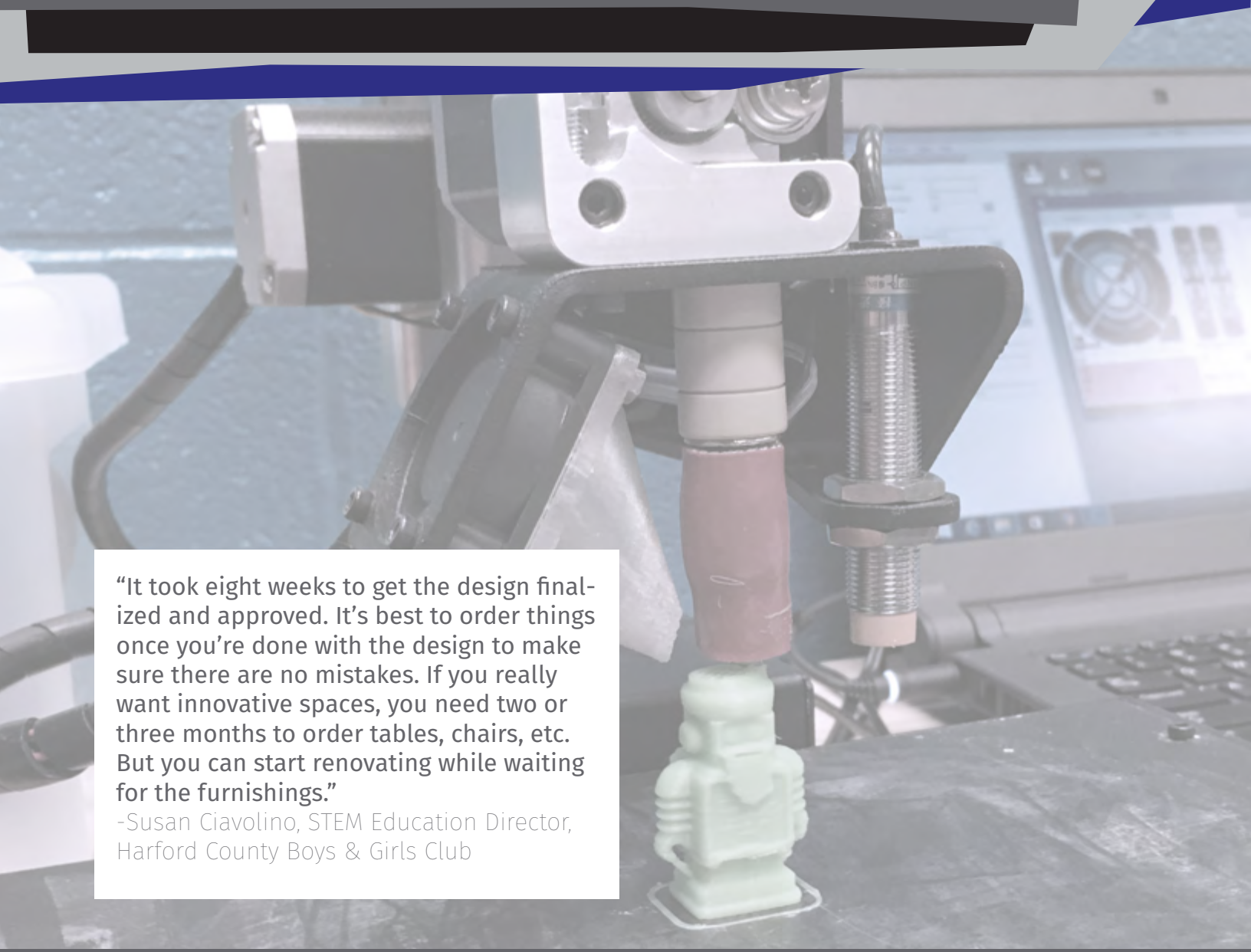
(suh-**plahy**)

noun

+ All items necessary for the equipment, maintenance and operation of a STEM Center of Innovation.
+ A collection of materials, including furnishings and technology.

verb

+ To furnish or provide what's needed.
+ To fill a vacancy.



"It took eight weeks to get the design finalized and approved. It's best to order things once you're done with the design to make sure there are no mistakes. If you really want innovative spaces, you need two or three months to order tables, chairs, etc. But you can start renovating while waiting for the furnishings."

-Susan Ciavolino, STEM Education Director, Harford County Boys & Girls Club

RECOMMENDED SUPPLIERS

Take your time to research equipment before ordering. Some suppliers will make site visits to suggest and demonstrate the products that best fit your needs.

You may need to special-order certain technologies and furniture in fun colors. Therefore, allow plenty of time when ordering for them to arrive. It is not uncommon for such items to take 8-12 weeks to ship.

RECOMMENDED SUPPLIERS

FURNITURE

- Ikea
- Wayfair
- Goodwill / Salvation Army
- Home Depot or Lowe's
- Local businesses who are refurbishing their own space

TECHNOLOGY

- www.stemfinity.com/bgca
- Amazon.com
- Best Buy
- Your local technology vendor

GENERAL SUPPLIES

- Arts & Craft Store
- Office Supply Store
- Collect recycled materials (cardboard, PVC pipe, egg cartons, newspapers, etc.)
- Fabric Store

RECOMMENDED MATERIALS

TYPE OF SUPPLIES

STORAGE AND SAFETY SUPPLIES:
Storage bins and tool cabinets for electronics, white boards, markers, safety glasses, gloves, dust masks, power strips, extension cords, brooms, first-aid kits, fire extinguishers

Basic Hand Tools:
Screwdrivers, hammers, wrenches, sockets, clamps, pliers, rulers, calipers, tape measures, box cutters, hack saws, scissors, wood saws, staple guns, glue guns, workbenches

Basic Power Tools and Electronics:
Soldering irons, multimeters, wire cutters and crimpers, battery holders, alligator clips, arduinos, motors, sensors, servos

Textile Tools:
Sewing machines, fabric scissors, needles, bobbins, irons, push-pins, safety pins

Consumables:
Glue, tape, sand paper, staples, blades, solders, thread, zip ties, batteries, wire, LEDs, paintbrushes, paint, wood, butcher block paper, fabrics, pipe cleaners, 3D printer plastic filament

Expert Tip
Review Your STEM Programming to determine what supplies you will need in your space. Visit BGCA's STEM Portal for information about our national programs. Be sure to include the needs and interests of your own teen population when considering STEM Programming additions.

Sample Makerspace Materials:

MakerEdResources

ORDER SUPPLIES

Take the time to jot down the items you need to order. This will help budget your time and money, as well as keep track of what you have coming and when it should arrive.

Here are some examples of details to list:

FURNITURE

Ordered?	Item	Supplier	Qty.	Total	Est. Recv.	Recv'd?
Y N	Armless Stacking Chair SKU: SF5217	Wayfair	10	$1,000	Nov. 15	Y N
Y N						Y N

TECHNOLOGY

Ordered?	Item	Supplier	Qty.	Total	Est. Recv.	Recv'd?
Y N	3D-Printers	Amazon	2	$800	Oct. 22	Y N
Y N						Y N

PROGRAM SUPPLIES

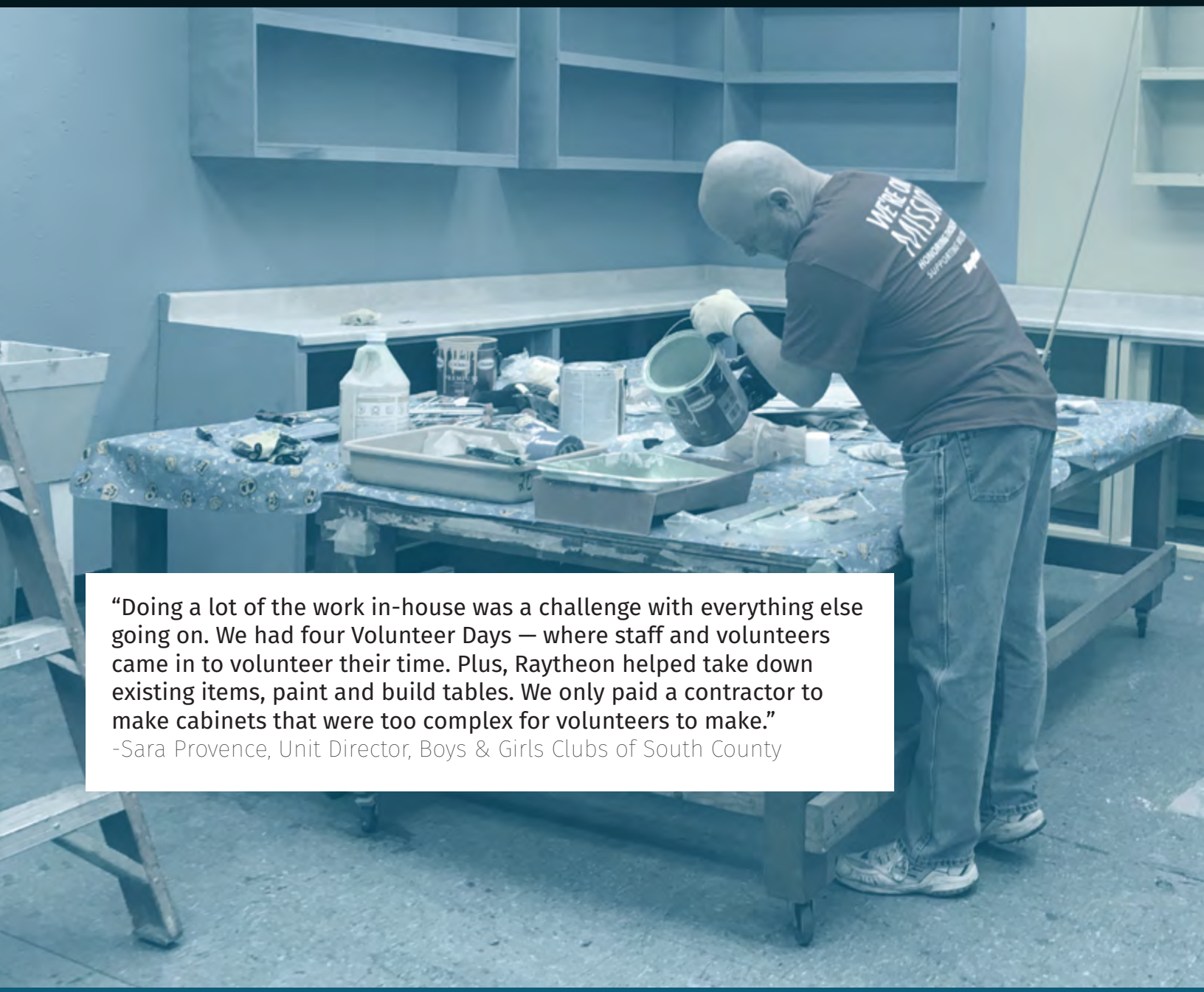
Ordered?	Item	Supplier	Qty.	Total	Est. Recv.	Recv'd?
Y N	Makey Makey Standard Kit	Robotshop.com	1	$49.95	Nov. 3	Y N
Y N						Y N

REMODEL

(ree-**mod**-l)

verb

+ To change the structure or form of a room or building.
+ Maker over; to fashion or shape differently.



"Doing a lot of the work in-house was a challenge with everything else going on. We had four Volunteer Days — where staff and volunteers came in to volunteer their time. Plus, Raytheon helped take down existing items, paint and build tables. We only paid a contractor to make cabinets that were too complex for volunteers to make."
-Sara Provence, Unit Director, Boys & Girls Clubs of South County

BUILD-OUT

Walk the space with a qualified professional to make sure it's up to code and can support your technological and other needs. You may need to update your wiring, ventilation or the structure itself.

Plan Volunteer Days where members' family, local professionals, partners and other willing workers can lend their expertise. The bulk of the work can be accomplished on those days for a fraction of the cost! This allows everyone to roll up their sleeves and lend their personal touch to a very important cause.

Based on the volunteer support offered, and the expertise available, determine what phases of the remodel to contract out for pay. This may include electrical work, sheetrock, painting, flooring installation, furniture building and anything else you can't safely and proficiently handle in-house.

BUILD-OUT TASK LIST

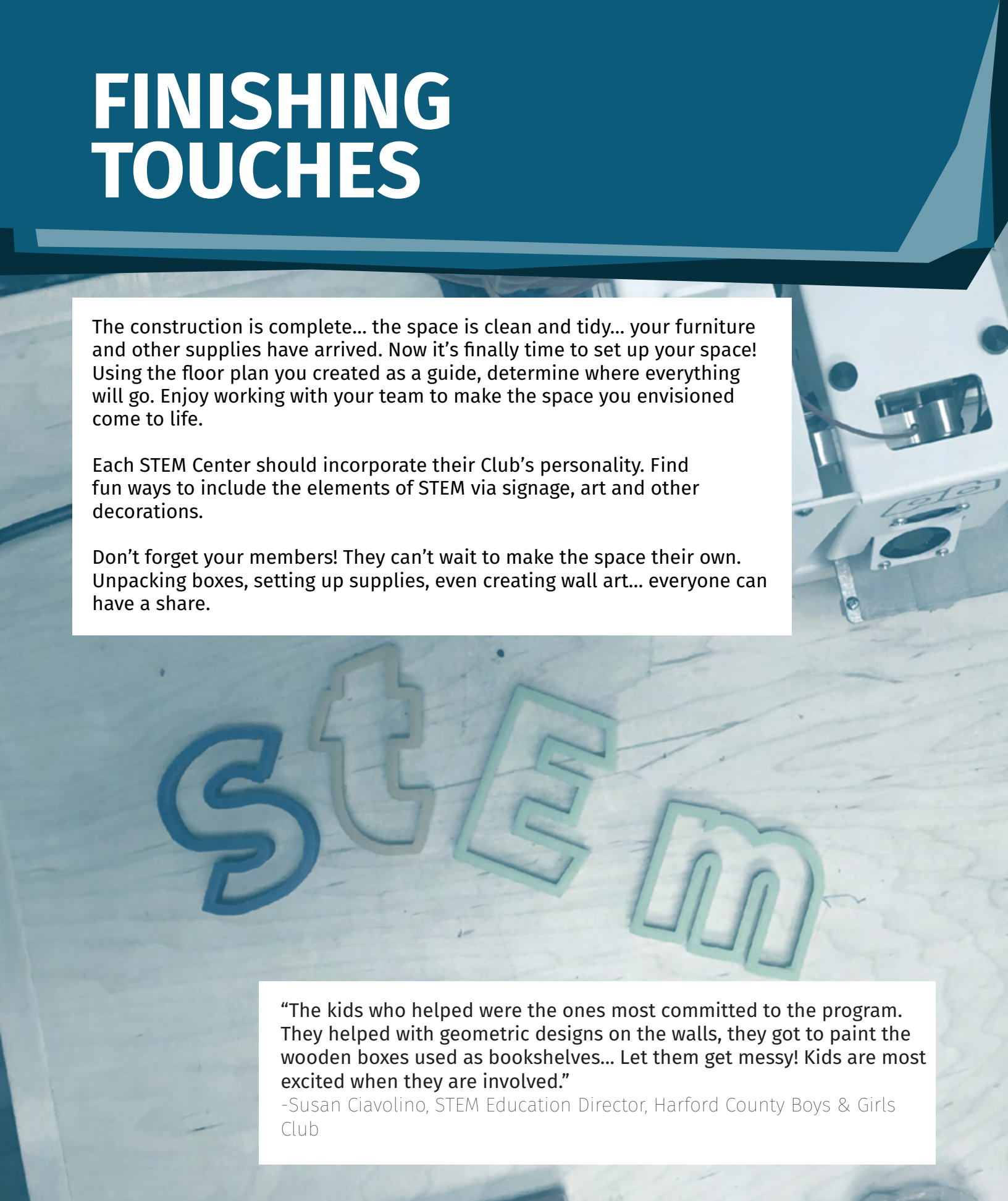
TASK	DURATION	EXPERT	MATERIALS	LABOR
1. Re-wire, add electrical outlets	2 days	Wayne's Wiring	$600	$800
2. Drywall repairs	2 days	Drywall Unlimited	$800	$1000
3. Painting	1 day	Volunteer Day	$200	$0
4. Assess Wi-Fi Internet Infrastructure	1 day	Hi-Speed Cable Provider	$500	$500

FINISHING TOUCHES

The construction is complete... the space is clean and tidy... your furniture and other supplies have arrived. Now it's finally time to set up your space! Using the floor plan you created as a guide, determine where everything will go. Enjoy working with your team to make the space you envisioned come to life.

Each STEM Center should incorporate their Club's personality. Find fun ways to include the elements of STEM via signage, art and other decorations.

Don't forget your members! They can't wait to make the space their own. Unpacking boxes, setting up supplies, even creating wall art... everyone can have a share.



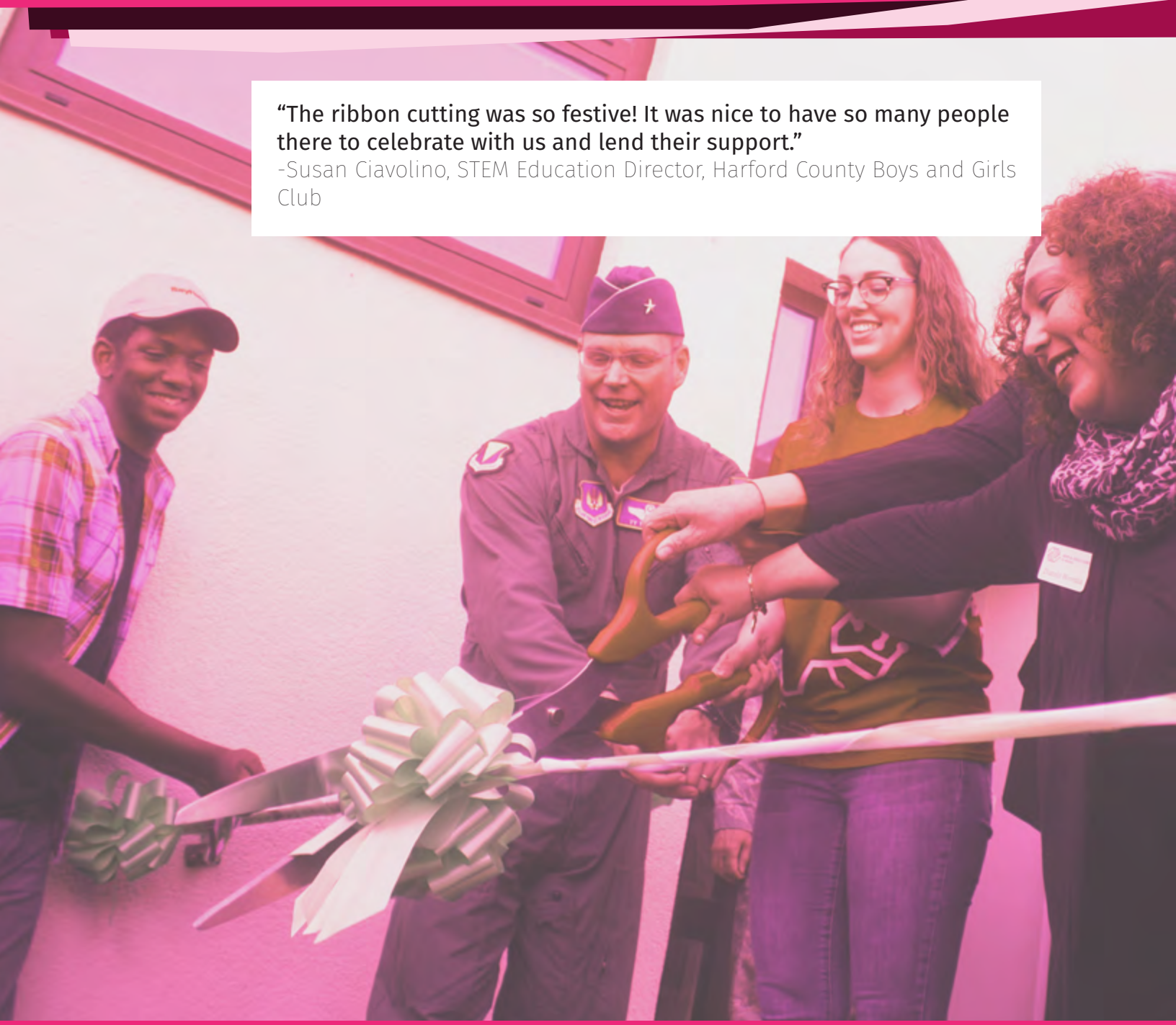
"The kids who helped were the ones most committed to the program. They helped with geometric designs on the walls, they got to paint the wooden boxes used as bookshelves... Let them get messy! Kids are most excited when they are involved."
-Susan Ciavolino, STEM Education Director, Harford County Boys & Girls Club

ROLLOUT

(**rohl**-out)

verb

+ The first public showing of a space or program.
+ The inauguration of a new product or service, as by a public announcement or exhibition.



"The ribbon cutting was so festive! It was nice to have so many people there to celebrate with us and lend their support."
-Susan Ciavolino, STEM Education Director, Harford County Boys and Girls Club

STEM CENTER REVEAL

After months of hard work, you are finally ready to reveal your new STEM Center – and promote the learning opportunities it will provide. Roll it out to your entire community – the mayor, local media, educational organizations, your members, their family and friends. Don't forget to invite those volunteers who made this project a success, along with the organizations they represent.

SAMPLE INVITATION

Thursday, April 21st, 2016
16:00 - 18:00

Ramstein Teen Center
Building 411
Ramstein Air Base, 09094
GERMANY

Please RSVP to Kimberly Grant by Friday, April 15th at Kimberly.grant.2@us.af.mil

Raytheon is partnering with Boys & Girls Clubs of America to create STEM Centers of Innovation at select Club locations around the world! This partnership, will support a high quality technology-based STEM innovation program and access to technology to support local and military youth attending the Ramstein Teen Center with skills to excel in achieving their academic goals and inspire them to pursue STEM-based careers.

Join us for an All STEM Day and Family Open House, with a special ribbon-cutting ceremony and hands-on activities for kids and families!