

# TINKERING TENETS

Every day at the Exploratorium, we witness firsthand how empowering tinkering can be—we're there for the head scratching, the trial and error, and the *aha!* moments that result from engaging your world, both physically and mentally. Here we've put together a few of our daily practices and some of the ideas that guide us in our work, and we hope that they will help you in your own tinkering adventures.

## MERGE SCIENCE, ART & TECHNOLOGY

On their own, science, art, and technology all make for interesting, fun, and rewarding explorations. But when you mix them together, you get a veritable tinkering trifecta in which technological tools and scientific principles let you express your own artistic vision. Plus, we find that when you make something that's personally meaningful to you, you get especially motivated to make it work, leading to tons of great insights into your chosen tools.

## CREATE RATHER THAN CONSUME

## REVISIT & ITERATE ON YOUR IDEAS

## PROTOTYPE RAPIDLY

When you have a new idea, it's incredibly helpful to get it out of your brain as soon as possible—to sketch a design or build a working model with stuff you have lying around. That way, you can make it real, work it out, and develop a concrete understanding of your next steps, then move on to Phase 2.

## USE FAMILIAR MATERIALS IN UNFAMILIAR WAYS

The world is full of stuff that was invented to do a specific job. But taking a common object and putting it to new use will likely result in unexpected, surprising explorations—like making music with walnuts or crafting tiny cities of tape. A bonus: These materials are often cheap and easy to find, and their universality means you can use them in near-infinite ways.

## EXPRESS IDEAS VIA CONSTRUCTION

## EMBRACE YOUR TOOLS

We love tools. Beyond being just plain useful, they're also an extension of your own critical thinking, letting you physically investigate the way things work—to get in there and pry, screw, hammer, and wire your way to a deeper understanding. And when you learn how to use a felting needle, multimeter, or hand drill, you open up a world of possibilities that allow you to fix things, remix things, and bring something new into the world.

## BE COMFORTABLE NOT KNOWING

### GO AHEAD, GET STUCK

When you tinker, you're going to mess up. You're going to get frustrated, fail, and maybe even break a thing or two. We call this getting stuck, and believe it or not, it is a very good thing. Failure tells you what you don't know, frustration is making sense of that failure in the moment, and taking action leads to a new way of knowing. Treat each of the problems that arise as a problem to play with—rather than a problem to solve—and practice working through times of frustration without judging yourself. You'll find that you develop an astonishing capacity for new understandings.

## REINVENT OLD TECHNOLOGIES (AND DISCOVER NEW ONES, TOO)

In this book, you'll encounter dozens of technologies (some old, some new) from all types of art practices and industries. We encourage you to consider all the possible tactics out there that can help you realize your vision—whether your project requires old-school woodworking, photo-making techniques from the 1800s, or relatively newfangled circuitry and programming.

## SEEK REAL-WORLD EXAMPLES EVERYWHERE

### TRY A LITTLE "SNARKASM"

We like to joke around while we tinker, and we call our particular brand of well-meaning wit and unprecious playfulness "snarkasm." A little humor helps—it's enjoyable and it alleviates the pressure of trying to make something work.

### BALANCE AUTONOMY WITH COLLABORATION

Tinkering with other people can be a blast and is a valuable way to get things done. It makes you explain your ideas, allows partners to cross-pollinate and share skills, and lets everyone be part of something larger than themselves. On the flip side, we advise going solo from time to time—it will equip you with a richer knowledge of your tools and materials, and you'll feel your confidence, your dexterity, and even your brain expand.

### PUT YOURSELF IN MESSY, NOISY & SOMETIMES DANGEROUS SITUATIONS

Tinkering can get tricky. Prep to use your tools safely, and practice techniques for cutting, drilling, soldering, and welding. But the dangerous aspect of tinkering is a powerful motivator—it forces you to slow down and pay close attention to what you're doing. A little caution goes a long way.

## TAKE YOUR WORK SERIOUSLY WITHOUT TAKING YOURSELF SERIOUSLY

Because tinkering should be fun. And when you let go of your ego, you give yourself permission to focus and play. That's when the good stuff happens.