Do It Yourself

CRASH Space's mascot Sparkles is a My Little Pony with a soldering iron sticking out of its head, typifying the whimsy and cleverness of the hackerspace scene.

Why join a hackerspace? If you haven't found a hundred reasons in the preceding pages, the scene probably isn't for you. And it isn't for everyone. Hackerspaces are for those who yearn for friends to share their technological and intellectual passions, to help them build the projects of their dreams. Hackerspaces are for those who are energized by the work of others, who love to learn and share. If you don't like to learn, if you're afraid of others taking your ideas, if you have all the tools you want, the hackerspace environment may not be a good fit. If your reason for not joining a hackerspace is that there is none nearby to join, it's time to start your own! Here's how.

SPREAD THE WORD

You can't have a hackerspace without a core group of people to make it a reality. Depending on how much money you and your friends are willing to shell out, you can start a space with a mere handful of people. On the other hand, sometimes it's easier to spread the work and money around with a large group.

Those founding members are gold—in many spaces, they still form the heart of the

organization years after their first meeting. Seattle's Jigsaw Renaissance was started in 2009 by seven friends. "All of them are still participants," co-founder Willow Brugh said. "From continued board members to holding occasional classes to using Jigsaw as their office."

In 2007, Jens Ohlig and Lars Weiler of Chaos Computer Club Cologne created the Hackerspace Design Patterns (http://www. scribd.com/doc/258372/Hacker-Space-Design-Patterns), which they presented at the 24th Chaos Communications Congress, a hacker convention in Germany. Their presentation and the accompanying slide deck have guided many hackerspace founders since then. Ohlig and Weiler suggested a minimum of 4 and ideally around 10 members to start with.

Here's a basic model: the fewer people you have, the faster the process will be, the more each member will have to pay, and the more the space will reflect your individual taste. By contrast, with a room full of people, the process will take longer as consensus is reached but each member won't have to pay as much.

Chances are, people willing to sit around in a meeting room or coffee shop discussing a

Credit: Pat Arneson

▲ *Hackerspace organizers meet at a coffee shop to plot their next move.*

Credit: Anne Petersen

▲ *Giveaways like buttons and stickers help spread word about the space.*

hypothetical hackerspace will be around long after the lease is signed. Ohlig and Weiler recommend recruiting people with strong personalities: "look for people who *have* authority (and get respect), not for people who *use* authority (and get laughed at)."

At this point you'll need to set up a web page, social media sites, wiki, mailing list, and forums to help spread the word. Just as importantly, be sure to complete a profile on hackerspaces.org, the worldwide aggregator of hackerspace information.

DECIDE ON AN ORGANIZATION TYPE

The central question when getting organized is should the hackerspace be for-profit or nonprofit? Let's examine the two types.

■ For-profit

In the United States this usually means a limited liability corporation (LLC) that basically protects the members from legal risk in the event that the business fails. Creditors might take the stuff in the space, but they can't go after individual members.

▲ *Prospective members of Twin Cities Maker vote to sign the lease to a new space.*

Credit: Pat Arneson

Hackerspace LLCs are often begun by those with a particular vision of how they want their space to be run and don't want to lose that vision—to lose what they love about the space. This doesn't necessarily mean that the spaces are run as companies or that the person whose name is on the LLC acts as dictator. In many cases the differences between an LLC and a nonprofit hackerspace are invisible to the outside eye.

LLCs are less concerned with hypothetically getting big donations because such gifts would not be tax deductible. On the other hand, they are extremely quick to set up as compared with a nonprofit, taking a couple hours on the Internet and a waiting period while the paperwork is processed. The LLC route is also appropriate if you actually do want to make a profit from the space. The "tech shop" phenomenon consists of all the trappings of a hackerspace but is focused more on offering tools to customers and less on fostering a community, and it's run as a business rather than a club.

Some LLCs do not actively recruit members. While the majority of hackerspace groups are open to all and are constantly recruiting, some prefer to keep a small group of friends as a core, only recruiting when someone drops out.

■ Nonprofit

Despite the benefits of the LLC, most hackerspaces go the nonprofit route. The way this works is that the prospective nonprofit must arrange its management structure and finances in the way the government is expecting. In the United States, this means having a board of directors as well as a group of officers who (at least on paper) do the actual managing: a president, vice president, secretary, and

treasurer. After a lengthy administrative process, the group might earn a federal nonprofit designation and not have to pay certain taxes, and donations to the group will be tax-exempt.

"A nonprofit business is a corporation which is prohibited by law and corporate documents from distributing profits and must reinvest any profits in the business," explained Twin Cities Maker development coordinator Michael Freiert. "This offers the next step of being able to receive tax deductible donations."

The board and officers imposed by law don't necessarily reflect the space's actual leadership structure. Often these public leaders do not attempt to exert their authority on the group; they're there to make the government happy. Instead, the group is run by consensus or anarchy or through some other governing structure.

Another disadvantage of the nonprofit is that it takes a long time to set up—sometimes upwards of a year—and the assistance of a lawyer. Often you can get a pro bono lawyer, but it is still a long and complicated process. In the meantime, some groups look for fiscal sponsorship through an umbrella organization. Space Federation (http://atrium.schoolfactory.org/spacefed/) is a 501(c)3 organization that accepts money from donors and passes it on to the member organization as a tax-deductible donation, with 10% of the funds kept to cover administrative costs.

Willow Brugh, a co-founder of Seattle's Jigsaw Renaissance, also helped create Space Federation. She sees it as being greater than just a vehicle for fiscal sponsorship. "By banding together, we also have a louder voice in larger culture and can start to lobby for insurance designations, appropriate zoning codes, and the

like," she said. "With our powers combined, we can create a sustainable place in Mother Culture. By having each others' backs, we can ensure we uphold our shared values of transparency, mutual aid, adaptability, and emergence." The group is even working on a Make-a-Space Kit that will aid hackerspace founders in creating their new spaces.

Outside the United States, you'll have to find out how the laws for nonprofits and companies are set up in your country. You may find that your government actively supports small organizations. For instance, in Germany and Austria, political groups receive money from the government so hackerspaces in those countries often have a distinct political tinge to them that is typically absent from U.S. spaces.

NAME YOUR GROUP

One of the privileges of the founding members is coming up with a name for the group. Look at the hackerspaces in this book for examples of the ideas other groups have dreamed up: Tokyo Hackerspace, NYC Resistor, /tmp/lab, and Pumping Station:One. It can be anything you want it to be.

Credit: Jeff Keyzer

▲ *Hackerspaces.org is an international clearing-house for hackerspace information.*

Usually—but not always—the name of the facility is the same as the name of the organization. In Minneapolis, two hackerspace groups—Twin Cities Maker and the Hack Factory of Minnesota—merged the groups to rent their new space. They named the organization Twin Cities Maker and called the facility the Hack Factory.

You should definitely choose a name you can live with, however, because it'll be very difficult to change the name later—usually it takes the dissolution of the organization. Some groups opt for a name that clearly spells out what the organization is about and where it is; others strive for a more unique or colorful name. "While 'Seattle Hackerspace' would certainly be more self-explanatory than 'Jigsaw Renaissance,' it just didn't work for us," said Brugh, one of the hackerspace's founders. "We wanted something which indicated tools, innovation, collaboration, and transdiscipline studies."

HOLD MEETINGS

To organize your group, you'll need to hold meetings—a lot of them. And the more people who are at these meetings, the longer it will take to reach consensus. Here are some tools that will help you get through these discussions.

- **Have an agenda**—While early gatherings are more about forging relationships, any working meeting needs to have an agenda. "Meetings should not be to discuss things; they should be to decide on things," Hack Factory founding president Mike Hord advised. "Long, drawn-out meetings can kill an organization, especially in the early stages where people are interested in getting to know one another." Having an agenda forces an end to contentious or drawn-out discussions.

- **Rules of order**—Many hackers have poor social skills and like to interrupt each other. Even worse, some toxic individuals seek to take over meetings out of a love for pedantry. The solution is a set of guidelines for managing meetings called *rules of order* (http://en.wikipedia.org/wiki/Rules_of_order). The rules call for an ordered, polite series of verbal exchanges whereby the majority opinion of the group is decided upon. The system most widely used is called Robert's Rules of Order, which lays down specific procedures for motions, amendments, and votes. "These are important to keeping a process moving forward," Hord explained. "One person cannot deadlock the meeting if everyone else—or even 'just' a majority—is in agreement."

  You don't have to use rules of order in every meeting, but at very least there should be an acknowledged chairperson of the meeting who can impose the rules if arguments break out.

- **Keep minutes**—It's important to keep minutes of every meeting, if only to inform people who missed the meeting what happened. More importantly, most hackerspaces are very open and sharing organizations, and any sort of deliberate secrecy is frowned on. Having a paper trail in the form of meeting minutes encourages that environment. "Transparency and member involvement are key to the success of a hackerspace," Hord agreed. "Pre-posting an agenda as well as posting minutes allows people to involve themselves in issues that they have a key interest in and prevents them being blindsided by decisions that affect them."

  Of course, a high percentage of members will never read them, but the important thing is that they have access to the hackerspace's records if they're interested.

Additionally, groups interested in attaining nonprofit status must keep minutes and other administrative minutia to stay in the good graces of state and federal regulations.

- **Reach consensus**—Many hackerspaces place a high value on decision-making via consensus, rather than having the leadership make the decision. Usually this involves discussing the matter until all present are in agreement. "My general rule is that you are only allowed to dissent if you have another solution you're willing to act on," Brugh said. "That said, everyone should have a chance to be vocal about where they stand—vocal with a time limit."

  Hord agreed. "Even after [a matter] has been moved, seconded, and voted upon, some people will still insist on attempting to reengage," he said. "Parliamentary procedure suggests gavel pounding and declarations of 'out of order,' but in a less formal setting, a firm but polite 'we're done discussing that,' repeated over and over will usually suffice."

- **When in doubt, call bike shed**—There is a recurring phenomenon in collective groups like hackerspaces called *bike shed* (http://en.wikipedia.org/wiki/Bike_shed), in which a trivial matter can derail an important undertaking. The classic example has a group agreeing to build a shed to store bikes but spends all its time arguing over what color to paint the new shed and end up not building it. One of the arts of meeting facilitation is learning to recognize bike shed behaviors and put a stop to them.

  "Consensus building," Hord explained, "is about knowing when to apologize and say, 'Sorry, but you aren't going to get your way this time because the detail you want to argue about isn't important enough to derail the entire project.'"

CREATE BYLAWS AND RULES

The rules under which the typical hackerspace operates can be seen as a spin on the "hacker ethic" (http://en.wikipedia.org/wiki/Hacker_ethic) that has evolved over the years: the sharing of tools and knowledge; decentralized leadership structures; and desire to move past racial, gender, age, and other stereotypes not related to one's skills. That said, it's good to have the rules and bylaws clearly laid out.

Bylaws are the rules under which the organization functions. They govern such matters as officer term length and how often board meetings are held. QC Co-Lab's bylaws (http://wiki.qccolab.com/index.php?title=By-Laws) are typical in this regard. The average set of bylaws are dry stuff, apropos mainly for "board-level" organization of the group. That said, you should definitely use the bylaws to spell out the extent of the powers of the elected leaders. Beginning with a benign president who doesn't abuse his or her powers doesn't mean the second president will be as cool.

Rules, on the other hand, focus on more practical matters as wood shop safety and where projects get stored. Although each set of rules will necessarily be unique to the space and its founders, certain patterns become evident. For instance, CCCKC's rules (downloadable as part of the membership packet at http://www.c3kc.org/membership) work as a Top 10 list, though starting at 0—traditional in hacker circles. CCCKC's rules read as follows:

0. Be nice to each other.

1. Be careful, but not too careful.

2. Respect everyone's equipment.

3. All members of the press must identify themselves upon entry.

4. Only take pictures with the subject's permission.

5. No solids in the sink.

6. No non-members are allowed without being accompanied by a member.

7. Everyone using tools must sign the paperwork.

8. Pick up after yourself.

9. Turn off the lights when you leave.

Hackerspace rules typically boil down to three: be courteous, be safe, and be clean. You definitely don't want a long and complicated set of rules because no one will read them. Indeed, Noisebridge has only one: "Be excellent to each other" (https://www.noisebridge.net/wiki/Noisebridge_Vision), a reference to the cult movie *Bill & Ted's Excellent Adventure.* Noisebridge's philosophy can be expanded to encompass several of CCCKC's rules. For instance, if you don't pick up after yourself, you're not being excellent to the person who follows.

One area that should be clear in the rules is that the spirit and letter of all laws shall be respected within the space. Many people still associate hackers with lawbreaking, and the rehabilitation of the term—not to mention the success of the organization—depends on members being above reproach when it comes to the law.

Ultimately your group will have to come up with its own rules. They might look very different than those previously mentioned if you are in a unique situation or if the founding members have a particular pet peeve they want to combat.

CHOOSE LEADERS

Whether or not to have official leaders, how to choose them, and how much power to give them are all questions that many hackerspaces struggle to resolve. The wonderful thing about the scene is that it seems as if every space comes up with its own solution. Here are some options:

- **Formal leaders**—Some spaces have no formal leaders, but many do. Indeed, as discussed previously, the government might even expect you to have a specific leadership structure. Some hackerspaces like the classic president-VP-secretary-treasurer format and stick with it. Formal leadership structures typically call for the board to make all decisions, only occasionally opening up the floor for regular members to weigh in.

Credit: Paul Sobczak

▲ *Board meetings, like this one at the Hack Factory, can be where all the decisions are made—depending on the hackerspace.*

However, many hackers find that structure very limiting and contrary to their idea of how the space ought to be run. For instance, it doesn't have a place for hackerspace-critical leaders like a network manager or wood shop foreperson. The authoritarian model also can cause a degree of paralysis, where non-board members won't take the initiative on a necessary hackerspace task for fear of "getting in trouble."

If you're going this route, be sure to build in a process for removing abusive or incompetent leaders into the bylaws, and remember that the final responsibility of the leader is to step aside in an orderly and timely fashion when he can no longer perform the job's duties.

■ **Informal leaders**—Ohlig's and Weiler's design patterns urge the use of temporary leadership to solve problems. Arguably some of this can come from European spaces' counterculture atmosphere, as well as the hugely influential Noisebridge. Their consensus process (https://www.noisebridge.net/wiki/Consensus_Process) is widely considered to be the gold standard for non-hierarchical management, though it might not be right for your group.

For example, the space is a pigsty and needs to be cleaned. One member gets mad and stands up and starts ordering people to collect recycling, sweep the floor, and organize the tools. It happens, and then the ad-hoc leader sits down and works on his project.

If a couple of members want to move a work table to another room, they just do it. This philosophy is called the do-ocracy (https://www.noisebridge.net/wiki/Do-ocracy) a method of non-hierarchical leadership advocated by Noisebridge and followed by many other hackerspaces. In the do-ocracy, whomever wants to take the effort to do something (in this example, move the table) goes ahead and does it, and if someone objects, the table-movers are obligated to undo what they did. Complicated and important matters are discussed in a weekly meeting until consensus is reached.

RAISE MONEY

As tacky as it sounds, it's a reality: a continual flow of cash is the number-one requirement for a healthy hackerspace. Let's be realistic—maintaining a lease and paying the electric bills, insurance, and other expenses

Credit: Jeff Keyzer

▲ *Need to make money for the group? Sell stuff!*

Credit: Anne Petersen

▲ *Dues are the single most important source of income to most hackerspaces.*

keeps the padlocks off the doors and lets members hack. Here are some tips for managing money:

- **Elect a totalitarian treasurer**—Ohlig and Weiler's Design Patterns say "Elect a totalitarian treasurer," and it's true. If a space wants to survive, it has to have a person—the treasurer—whose job is to collect dues, even if his or her own friends are the deadbeats. The ideal treasurer won't take excuses and won't make exceptions.

- **Set a budget**—In addition to collecting money, the treasurer needs to manage the budgets professionally. The big items—rent, insurance, water, trash, and heat—are obvious. But don't neglect seemingly optional supplies like cleaning products and toilet paper. Definitely budget for a robust Internet package; nothing makes a room full of hackers crabby like no tubes.

- **Solicit donations for unexpected expenses**—Often, expenses that weren't budgeted for end up getting paid ad-hoc by members, but you shouldn't count on this generosity. One solution for paying for these items is to solicit donations from members who use the relevant area. For instance, in one hackerspace, the MakerBot users realized they needed a new power supply for their 3D printer. It was decided that the people who used the machine should chip in to buy the new part.

- **Diversify income stream**—Dues are the number-one source of income for most hackerspaces, but it shouldn't be the only one. Sometimes the ebb and flow of interest leaves the rolls a little thin, and you shouldn't have to worry about making rent just because a couple of members are late on their dues. Other sources could include class fees, beverage sales, rent parties,

t-shirt sales, and admission fees to special events. Be aware of your local laws governing raffles and other moneymaking operations.

- **Solicit donations**—Donations, whether on the books as tax-deductible or otherwise, are a reality of the average hackerspace. Most of the time it takes the form of a few bucks dropped into a donation jar or a member bringing in her power tool to keep at the space. Sometimes bigger guns are needed, and that's where microdonation sites like Kickstarter come in.

When he started his new hackerspace, Nick Farr set up a Kickstarter page to solicit donations. He asked the space's keyholders to contact their friends and family to donate a total of $3,000 to help get the space set up. They ended up receiving $5,000. "I guess that's the key," Farr said. "Actually reaching out to your network in ways that go beyond social media. We all dropped a few key emails

▲ *Unallocated space received $5,000 in donations to offset renovations.*

to our friends and people we've supported with their endeavors, explaining what our hopes and dreams were for the space, and they responded well beyond our expectations!"

- **Be financially independent**—A note on sponsors and financial benefactors: Don't do it. You should never be beholden to an organization or a person for the survival of your group. If you need such a group, you probably need to recruit more members. If you absolutely must accept the help of a benefactor, make independence your first priority. At the same time, resist the temptation to use someone's house or apartment, or to save money by letting someone live at the space. Anytime you combine someone's work area with someone's sleeping area, there will be conflicts.

- **Save for a rainy day**—Just like your home budget, you should save a little extra when you're flush so that you won't be scrambling for cash during a slow period. Wouldn't it be nice to have three months of expenses in the bank?

FIND A SPACE

Look how far we are into this chapter, and we're only now talking about finding a space! That demonstrates how much work goes into getting organized enough to shell out for a lease. Unless you're lucky, however, finding the right space can consume just as much time. To be clear, you'll want to find the right space from the beginning because it's very expensive and labor-intensive to switch facilities. More than one hackerspace has disbanded after losing its lease. But with that much at stake, how can you be sure to find the right space?

Some groups come by free space, either contributed by a member or by an umbrella
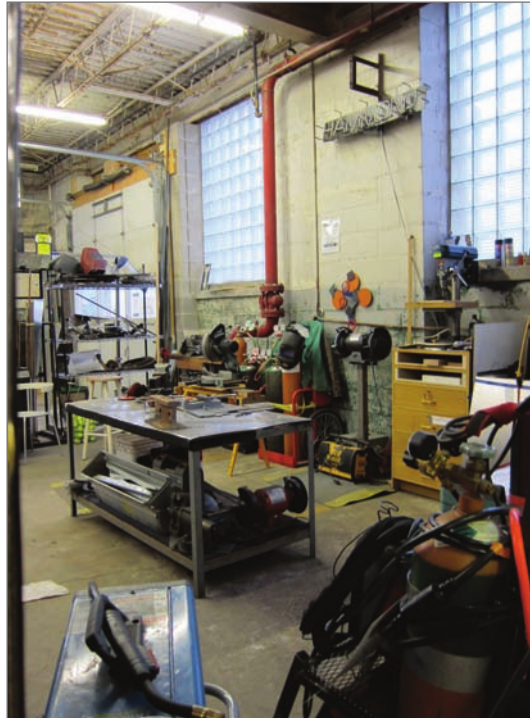
▲ *Want a metal shop in your new space? Plan accordingly when looking at properties.*

organization. The problem with this is that the group will always be beholden to this benefactor and, at best, will live with the possibility of being abruptly evicted or having the parent group set rules for activities that can take place in the space. It's better to be independent. Even subleases offer problems—Twin Cities Maker in Minneapolis nearly found themselves homeless when the company from whom they'd subleased abruptly moved out.

One very important factor is to find a space with the right kind of electricity. Can the space support the power needs of a laser cutter, arc welder, and kiln? If not, you might want to look for another facility or be prepared to upgrade the power yourself.

The most kindly landlord won't help if the space isn't right, however. The first thing you should do when looking at properties is to keep in mind the activities the members would like to undertake at the space. If there are a lot of foodies in your group, for example, be sure to find a space with a kitchen. Milwaukee Makerspace's members are interested in car projects and found a space with a drive-in work area to facilitate this kind of work.

Ohlig and Weiler's Design Patterns suggest a lot of small rooms rather than one big space. This allows members to explore many areas of interest that might conflict with others. For instance, a wood shop generates a lot of sawdust, so you don't want it next to your server room. A chemistry area might have fumes, so it'll need a tight-shutting door and a vent to the outside. You'll definitely want some sort of chill-out area or lounge, with snacks and beverages available for purchase, along with a lockable closet for storing cases of pop and other consumables.

To a degree, choosing the right neighborhood can be almost as important as choosing the right facility. You want a neighborhood with lots of parking, coffee shops, takeout, and other services. The Hack Factory in Minneapolis has a classic full-service hardware store less than a mile away and sends a lot of business their way. But having great neighbors can also be important. Hackers tend to work through the night and often experiment with chemicals, vehicles, and pyrotechnics, so avoid quiet and cozy neighborhoods. Ohlig and Weiler's Design Patterns agree: "As hackers, you do not live the majority lifestyle—look for neighbors who are also weird and outside the majority."

Credit: Anne Petersen

▲ *Not every facility—or landlord—is ready to accommodate a chemistry lab. If you want one, be sure to keep it in mind while hunting for the perfect space.*

Jigsaw Renaissance's Willow Brugh offers some advice on finding the perfect facility. "Your landlord is the most important thing," she said. "Either a benevolent absentee landlord or one who *gets it* are best." You'll want a landlord who doesn't care if there are soldering irons, welders, or laser cutters being used in his property. Obviously, some of the trappings of a hackerspace can be pretty intimidating to someone from outside the scene. On the other hand, many hackerspaces are willing to move into a run-down property and fix it up, and that generates a lot of goodwill during lease signing.

EQUIP THE SPACE

Hackerspaces accumulate a lot of stuff, ranging from table saws to heaps of useless junk. The important thing is to have the right tools and furnishings. Too few or the wrong equipment and members won't be able to do the activities they want. Too much equipment can be a detriment as well. Imagine a wood shop so full of tools brought in willy-nilly from members' garages and storage lockers that no one can get anything done—you probably don't need four band saws at the space. Here are some common areas found in hackerspaces:

▲   *A fully equipped craft area is an asset to any space.*

▲   *Members of Ontario's Kwartzlab relax in their space's chill-out area.*

■ **Chill-Out room**—Don't underestimate the importance of a lounge. Many members join mainly to socialize with like-minded hacker types, and you don't necessarily want them standing around the metal shop. Stock your chill-out room with couches, chairs, recliners, coffee tables, incandescent lights, stereo equipment, and video games. You might want to consider a soda machine because these can be an income stream as well as an amenity.

■ **Crafts area**—The catch-all term for knitting, sewing, leather working, and so on. Crafters need a lot of clean table space and good lighting. You should invest in an industrial sewing machine, an electric kiln, craft scissors, hot glue guns, a vinyl cutter, paints, a screen printing setup, and so on. The Hack Factory has a mini photography area with umbrella lights and a white backdrop.

■ **Network operations center (NOC)**—Every space needs networking equipment, even if it's just a cable modem. Equip your NOC with racks, backup power, network routers, wireless routers, and servers. You might want to lock the room so self-styled experts don't mess with the setup on some Saturday night when the Internet is acting up. If you've designed your own security system, its back end can live in the NOC.

■ **Fabrication lab**—Many hackers are interested in rapid prototyping, and having a fablab available to them will help them build their dream projects. Fabrication tools cost many thousands of dollars, but many spaces do what it takes to buy or build them. Most groups have at least one MakerBot or similar 3D printer, and many also have a laser cutter. Equip your lab with those two if you can, and add CNC mills, 3D scanners, plasma cutters, and other rapid prototyping machines.

Credit: Paul Sobczak

▲ *Every hackerspace needs rapid prototyping equipment like this CNC mill.*

■ **Wood shop**—A hackerspace woodworking area can take you back in time to shop class, but it's a critical ingredient. You should stock your table saws, band saws, drill presses, routers, grinders, and an air compressor with tool attachments. Hand tools, too, are a necessity. Wood shops use a lot of consumables like saw blades, sandpaper, and drill bits, so stock up on those. Also, be sure to get at least one shopvac for cleaning up sawdust. Don't neglect safety gear like goggles and earplugs.

Credit: John Baichtal

▲ *Most hackerspaces have at least one drill press.*

Credit: Paul Sobczak

▲ *Brewing classes are among the many educational offerings of hackerspaces.*

■ **Classroom**—Most hackerspaces hold classes, so having a separate classroom ensures that people can still work while a session is underway. In addition to comfortable chairs and work surfaces, a decent sound system and a projector are good bets.

■ **Electronics shop**—This is one of the most popular areas in many hackerspaces, so much so that many don't have a dedicated room for electronics, and instead merge it with the social space. You'll need multimeters and oscilloscopes, as well as solder reflow ovens and PCB etching stations. Get a lot of soldering irons for your electronics area because soldering classes always draw a big crowd.

■ **Metal shop**—A metal shop can be a little obnoxious, with all sorts of sensory overflow, like light from arc welders, noise from grinders, and fumes from oxyacetylene torches. However, you'll be happy to have a full-fledged metal shop in your space. In addition to welders, be sure to get grinders, a plasma cutter, metal-cutting band saws, safety gear, hand tools, a metal-casting furnace, and an anvil.

■ **Storage**—Be sure to reserve room to put stuff because a bunch of hackers generate a lot of projects (and half-built projects) that will need storage. One solution is to rent storage space to members. For instance, $5 a month for a lockable cabinet is a good deal and puts money in the coffers. Even better, it ensures the contents of the locker don't get left behind when a member quits; orphaned projects are a big problem in hackerspaces.

In the end, you should let your members drive the tools. Your founding group may like one thing, but adding 20 new members with diverse interests is likely to expand your hackerspace's coverage in ways that surprise you.

▲ *Every hackerspace needs a metal shop.*

▲ *Storage and safe-keeping of projects, tools, and materials is a continual struggle for many hackerspaces.*

Credit: Paul Sobczak

Credit: John Baichtal

MAKE IMPROVEMENTS

If the perfect space simply can't be found, one solution is for hackerspace members to remodel the place themselves. After all, you have dozens of people who are handy with tools and motivated to improve the facility, so why not use them? Often members will have friends who are licensed plumbers and electricians, lending critical support to help make the project happen and making the landlord happy by improving his building for free.

▲ *Unallocated Space's loft adds much-needed square footage to the space.*

▲ *The hackerspace's new "chill-out area" overlooks the main workshop.*

In D.C.'s Unallocated Space, the members took advantage of a high ceiling to add a loft. Their treasurer, Nick Farr, described the project: "Soon after we moved in, one of the corners ended up becoming our lounge/chill-out area where our big TV, video game systems, and couches were. After I found a used steel mezzanine from a surplus place in Rhode Island that would fit that corner, we decided to 'elevate' our lounge area, to leave the rest of the shop floor as workshop space." The group ended up building the loft by hand, "which was a really dumb idea," Farr said. "We raised the 500 lb. stairwell into place using 2×6s and pallets—which is not something I would recommend. But we're really, really happy to have a space 'above it all' to chill out."

Other possible upgrades include painting, building shelves, ripping out old carpeting, and dividing up large rooms into small ones.

KEEP IT CLEAN

Hackerspaces tend to be messy, filled with half-finished projects, junk for salvage, and tools that haven't been put away. Never mind soda cans, solder snippets, disorganized shelves, overflowing trash cans, sawdust, and general messes and spills. There are coffee cups stacked in the sink and a bathroom that hasn't been scrubbed down in weeks. It's very easy to let the space get horrid if no one steps up to clean and organize. Here are some tips for keeping a tidy space:

- **Quarterly deep clean**—No matter what, chances are the hackerspace will need to be thoroughly cleaned every few months. Find the member who is the most irate about the current mess and put that person in charge of the deep clean. Hackers are often willing to clean but don't want to

put any thought into it, and having some-one in charge of the operation will help motivate them.

- **Load up on the cleaning supplies**—Stock a broom closet with cleaning products, brooms, rags, scrub brushes, vacuums, and so on. Don't let the space get messy for lack of supplies.

- **Clean after events**—Organizers of classes, talks, and other gatherings in the space should schedule 15 minutes at the end of their events for attendees to clean up their area after the event is done.

- **Periodic junk cleanout**—Found and donated junk tends to pile up. Every few months, go through the junk and weed out the stuff that has been sitting on the shelves for a while. Find out how to recy-cle computers and other electronics in your area, and dispose of the junk responsibly.

SECURE THE SPACE

A hackerspace can contain many thousands of dollars in tools and equipment, and it's definitely suggested that you get some sort of alarm system and modern locks. The need to secure the space has given rise to the phenomenon of the keyholder, a mem-ber of good standing who is trusted with a key to the space. Simply put, the hassle

of recovering a key from a former member, not to mention the expense of cutting new keys, means that these spaces are hesitant to allow every member to hold keys. (In Forskningsavdelningen in Malmö, Sweden—featured in Project #13—new members have to learn how to cut their own keys on a key-making machine.)

In the last few years, more and more spaces have been building their own security sys-tems (see Project #19 for an example) that utilize RFID or numeric entry codes, allowing every member, in effect, to be a keyholder. The advantage of these systems is that a former member's key (or code) can simply be deactivated, reducing the number of keys floating around.

BE SAFE

▲ *Seriously, be safe!*

▲ *TheTransistor's homebrewed security system admits members when the right code is entered.*

With a building full of power tools, lasers, flammable gas, and so on, it's absolutely important to maintain a strict safety policy. First, supply members with whatever skin, ear, eye, and respiratory protection they'll need. This means large stocks of goggles, earplugs, welding masks, gloves, lab coats, and so on. Post warning signs by potentially lethal tools like band saws and lathes, and be sure the appropriate areas are equipped with fire alarms, extinguishers, and a robust first aid kit. If chemicals are in use, look into installing an eyewash station.

Member training is important as well. Hold classes to certify new members on the dangerous and fragile tools. Educate members on safe clothing and attire, and set sensible rules for tool use, like asking members not to use certain tools if they're by themselves in the hackerspace. No one wants to get injured and not be able to get help immediately. Finally, you might even want to appoint a safety coordinator whose job is to set safety rules and conduct training sessions.

RESOLVE CONFLICTS

As you establish your hackerspace, you'll probably go through a honeymoon period where everyone is giddy with the new clubhouse. Inevitably, however, conflicts will arise. Someone might show up at the space to find his or her favorite area rearranged. A rebellious member might not like a new rule or policy laid down by the board. Or two hackers might simply not get along.

"Defining your values helps prevent conflict, too," explained Brugh. "Saying, 'we stand for these things, if you don't adhere to these, you can't play' makes it much easier for everyone to know how to interact. Jigsaw has a waiver like everyone, but we also have a membership agreement and safe-space agreement."

The best way to deal with conflicts is to sit down and talk it through, with a moderator if necessary. Other methods could include having a respected but uninvolved person talk to the troublemaker(s) in private. If that doesn't work, an all-members' meeting may do the trick: discuss the matter until a resolution is found.

Sometimes the problem is that someone cares *too* much. Inevitably, there will be unemployed hackers with insane amounts of time to devote to the space. These folks are both an asset and a hindrance. Although they have a lot of time and energy for the organization, they become obnoxious and abuse the do-ocracy; when everyone else is at work, they're hanging out at the space making it more like they want, annoying their fellows with more stringent schedules. Learn how to cool these members down without alienating them.

Finally, have a mechanism in the bylaws for expelling members, but don't use it unless you must. Sometimes, a hacker is too toxic to be salvaged. Maybe he steals, acts in a violent or unsafe manner, or doesn't play well with others. If that is the case, there should be a procedure for expelling the member.

SHARE EVERYTHING

Every space is different, and every organization has the right to choose for itself what sort of information it wants to share, but most hackerspaces share everything from tool lists to current projects. The culture of learning and doing, many hackers believe, thrives on people sharing what they've learned.

When you begin forming your group, you should have a wiki, forums, a blog, photo hosting, an IRC channel, and social networking sites like Facebook and Twitter. This stuff is obvious, but don't overlook more creative ways of sharing what you do.
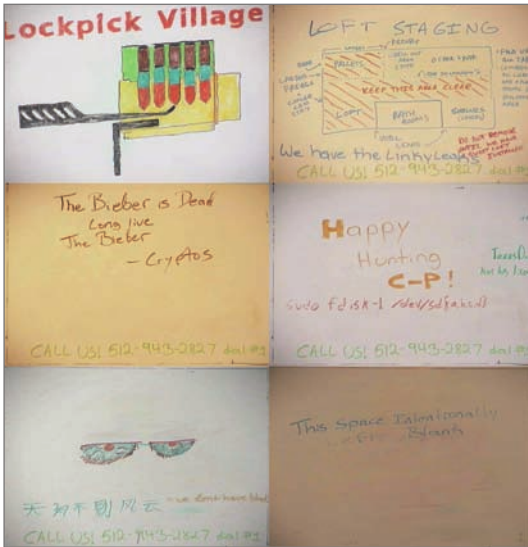
▲ *Several snapshots of Unallocated Space's white board; every time the space is shut down for the night, another photo is snapped.*

For instance, Unallocated Space in Severn, Maryland, has a camera focused on their white board (http://www.unallocatedspace. org/thewall/), and every time the security system is engaged—for example, when the space is closed for the night—the camera shoots a photo of the board and uploads it to the Web.

This sharing helps casual members keep abreast of what's going on in the space, it lures in potential members who want to be part of the fun, and it inspires other hacker-spaces to attempt projects and activities as cool as Unallocated Space's.

RECRUIT NEW MEMBERS

Most hackerspaces are in continual recruit-ment mode, simply because of the importance of dues to keeping the organization alive. But how does one find these recruits? One trick is to lure visitors to the space with fun and engaging events—for example, classes, talks, and parties.

▲ *One of NYC Resistor's rent parties attracts a crowd of visitors to the hackerspace.*

▲ *Alpha One Labs' sign-up sheets are ready for any prospective members who stop by.*

Probably the most useful recruitment tool is the regular open houses that most hacker-spaces hold. Often they're on a Tuesday or Wednesday, and most of the members of the space congregate to socialize and work on projects. Visitors who attend can get a taste

of the atmosphere at the space and meet the other members. Be sure to have a stack of business cards, flyers, and sign-up forms available, and make sure someone's able to accept dues and a key deposit to take advantage of impulse sign-ups.

You'll definitely want people of both genders and all races and backgrounds. It isn't political correctness; it's simply a fact that these people can bring a vastly different perspective and set of skills to the table, and the more knowledge your hackerspace has access to, the stronger and more useful it will be to members. That said, don't try to recruit anyone and everyone. If the space isn't right for them, getting to pay dues for a month or two won't help anyone—you want someone who'll stay for years. "Be what you say you are," Brugh agreed. "If you're an event space, hold solid events. If you're a hardware hacking space, hack some hardware. It's basically walking the walk but also talking about it."

You can also recruit members outside the space. Fairs and conventions are a great way to showcase the group's projects and interact with potential members. Many hacker-favorite gatherings like Hackers on Planet Earth and Maker Faire have "hackerspace villages" where members congregate.

TEACH CLASSES

Hackerspaces are learning places, and oftentimes that learning takes place in the form of a class. Topics can include anything from woodworking to programming to electronics: any subject a member is good at and is willing to teach.

In addition to educating people, hackerspace classes are good in two ways. First, they attract a group of people who aren't necessarily interested in membership but want to learn the topic. Just getting them in the

▲ *Members of Milwaukee Makerspace attend a class on Arduinos.*

door is a victory because it exposes them to the hackerspace environment, so some of them might eventually become members. Another benefit is the money classes bring in. Charging $20 to attend a class might not seem like a lot of money, but it adds up. Many spaces end up deriving a significant portion of their operating expenses, using the money to fund improvements in the area related to the class. The proceeds for the welding class, for instance, can go to supplies for the metal shop, encouraging members who use the area a lot to volunteer to teach a class.

As another inducement, many spaces kick back some of the proceeds to the teachers to offset their dues, so an underemployed hacker can teach rather than pay—and everyone wins.

HELP THE COMMUNITY

Could hackerspaces be an important resource during disasters? It may be that hackers' unique mix of skills make them ideal for ad-hoc support for the local population. Akiba, the hacker from Tokyo Hackerspace (profiled in Project #3), explained that our ability to

▲ *A kimono lantern, an easy-to-build solar light kit, can be distributed during power outages.*

purchase what we need breaks down, making the ability to create, repair, and modify extremely important. "You suddenly need a lot of things customized to a particular situation," he said.

During the 2011 Tokyo earthquake, Akiba and his hackerspace friends responded to dangerous radiation levels by hooking up Geiger counters to the Web. "Geiger counters were devices that used to be only purchased by people working with radioactive materials, paranoid militia, and weather geeks. Now they are becoming an everyday item in Tokyo."

"Hackerspaces have tools and members with knowledge about how to make things from scratch and modify devices to suit their needs," explained Akiba. "If a major environmental disaster were to hit San Francisco, I can imagine that Noisebridge would have weather balloons, monitoring stations, and software to disseminate all the information to the public within days."

Hackerspaces can also create ad-hoc networks to help each other. When Akiba looked for help creating kimono lanterns, solar-powered emergency lights, he was amazed at the response. "Within one day, we had offers coming out of hackerspaces in Oklahoma, Arizona, Detroit, Hong Kong, San Francisco, Germany, Singapore, and many other places."

NOW WHAT?

It's a lot of work and can be a big headache, but building a hackerspace can also be incredibly rewarding. It's hugely inspirational collaborating with so many brilliant people with interests different from your own. You can build the projects of your dreams for less than a cable bill, learn skills you never knew existed, and find companionship in smart people with overlapping interests. Years from now, when hackers from the other side of the world have heard of the accomplishments of your space, when dozens of talented and adventurous hackers have found a home there, you can fondly look back on your first hesitant steps.

Where your group—or the scene in general—will be in 20 years is hard to predict. The first wave of hackerspaces that were formed in the United States in the early '90s were very different from the groups we know today. Europeans took the concept and put their own spin on it, transforming the secretive hackerspace into an open, political, almost countercultural movement. The third wave of hackerspaces that began with the founding of Noisebridge, NYC Resistor, and a few others is still going. It has moved past the U.S.-Europe dichotomy to include every continent on Earth. It has largely dropped the secretiveness of the first wave and the overt politics of the second and learned from both of them.

The hackerspace of the future might take on the role of a community resource. Hackers' tinkering focus and the knowledge of tools and technology potentially make them invaluable in circumstances where the local community can't help. "In normal life, you can

pretty much buy anything that you would need for everyday living," Akiba explained. "But in a disaster scenario, this all breaks down. At that time, normal life ceases and you suddenly need a lot of things customized to a particular situation." All of a sudden, hackers' ability to prototype new devices and love of outmoded skills like knitting and brewing make them incredibly useful. Many hackers are ham radio enthusiasts, and being able to operate communications networks during disaster situations can be critical.

Spaces can be business incubators, giving entrepreneurs the tools and space they need to develop products. Not needing to rent space or buy tools lowers barriers and lets more people have the chance to start their own business.

Or hackerspaces can look more like schools. Why should impoverished school districts maintain wood and metal shops when they could theoretically hold class in the hacker-space? With these groups focused so much on education, it wouldn't be a stretch for those same rapid prototyping, metalworking, and knitting classes to serve schoolchildren as well as adults.

Looking at the history of the movement, it's incredible how new and exciting it all is. Spaces founded a mere four years ago are considered established and respected, while most groups have been around less than two years. Who is to say what the future holds?

We're at the very forefront of a new and exciting phenomenon. Come be a part of it.