



# 10 WAYS TO TRANSFORM YOUR LAB

A tremendous amount of investment went into the construction of science facilities during the 1950s through the 1970s. And, because huge sums of money went into building up many of these laboratories, which still stand today, they can't just be bulldozed and rebuilt—it would be terribly wasteful. Yet these labs often seem ill suited for modern research. Researchers' complaints range from cluttered countertops to distracting noise to overcrowded work spaces, just to name a few. These problems create stress and drag on productivity. Others say they have simply outgrown their space, or their work has developed beyond their lab's current technical capabilities.

What happens when a scientist would like to take her research in a certain direction, but her assigned space doesn't allow it? Remodeling could be the answer. There's a growing industry in rehabilitating and modernizing research facilities. Architectural experts say a few strategic changes can bring much needed relief while boosting productivity.

James Hudspeth, director of the F.M. Kirby Center for Sensory Neuroscience at the Rockefeller University in New York, knows firsthand the challenges and rewards of remodeling a lab. As his interdisciplinary research into the biophysical aspects of hearing has expanded over the years, Hudspeth has had to undertake major lab renovations three times during his career.

The most recent remodeling of his lab, completed last year, involved revamping a workspace in an entirely different building. Hudspeth's move is a good example of creative problem-solving that employed a team of architects, engineers, his lab manager and an unflappable project manager. On the following pages, leading architects offer suggestions on how you, too, can update your lab space.

**1 Know your needs**

“A big trend that we’re seeing is interdisciplinary science,” says Tony Alfieri, a New York-based architect at the firm of Perkins+Will, which specializes in spaces used for science. In other words, biologists are no longer just biologists—they’re drawing on different areas of science and linking up with other types of researchers. These cross-disciplinary collaborations mean that lab renovations have to take into account unique technical needs.

Specialized technical requirements completely dominated Hudspeth’s renovation project. His work on the biophysics of hearing requires an absolutely silent space—free from vibration and background noise—so that he can conduct sophisticated experiments.

More specifically, Hudspeth wanted to perform experiments on sensitive hair-cell bundles found in the ear. With this in mind, technical consultants from the firm AKF Engineers designed an innovative isolation chamber that absorbs ambient noise and shields magnetic fields. “The engineers rose to the challenge and created a completely new ventilation technology to meet the technical needs of my research,” says Hudspeth.

**2 Get real and get going**

The first person called to help with a remodeling mission is usually the project manager. At the Rockefeller University, it was Daria Moore. She liaised between Hudspeth, laboratory staff, the architects and

the contractors. “As the project manager,” says Moore, “I am the key person who has to decipher what the professor thinks he wants and then translate that into something that the architect and engineers can interpret.” In the past, she has also been the person caught in a tug-of-war for resources—when the professors want everything made of expensive teak wood or with fancy amenities, she advises what is realistic. The project manager sorts out what is practical and keeps the project on budget. Establishing a good working relationship early with a project manager and communicating goals clearly to this key person will smooth the renovation process.

**3 Promote productive collisions**

“Researchers are no longer working in a vacuum,” says Alfieri, who did not work on Hudspeth’s new lab but has worked on similar projects. “The best ideas come from collaboration and what we call ‘productive collisions’—these random connections and collaborations that start casually over coffee.”

In Hudspeth’s previous lab, everyone had his or her own small office, which was dark and lonely. So Hudspeth asked the architects to completely redesign the office space. They started with an open floor plan and installed study carrels so people could choose when to collaborate and when to retreat to their computers. The architects also placed the break room, equipped with a good coffee machine, nearby.

**4 Prioritize bench space**

One of the major complaints that Alfieri hears repeatedly from scientists is the lack of adequate countertop room, or ‘bench’ space. Hudspeth faced this challenge, as well. In his former space, the bench tops were narrow and antiquated, literally built during a time when microscopes were the leading edge of technology. He decided to change that by making the benches a high priority during the renovation.

“The new bench tops are wide, deep and safer, with rounded edges,” says Hudspeth, “and they’re easy to clean.”

**5 Unpack storage problems**

Scarcity of storage space is also a major complaint that Alfieri hears often. He explains that organizing tools and gadgets is a big challenge for every scientist. In Hudspeth’s lab, it was a particularly vexing problem because they custom build their own tools—and the problem would only grow, because he added a small machine shop to the lab during the renovation. Disorganized and proliferating tools amount to piles of clutter that impede the flow of the lab.

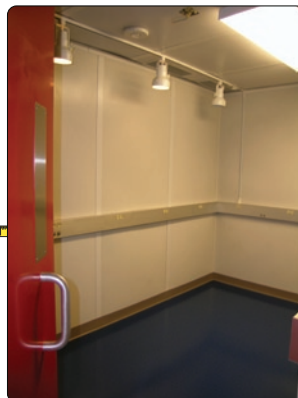
To deal with this, Hudspeth worked with his lab manager to come up with a more effective organizational scheme. They grouped tools by function rather than by name or model. That allowed them to provide specifics to Moore about what kinds of storage areas they needed. “We maximized storage space by filling up every square inch with cabinetry:



The lab before...



Unveiling the mural



After the renovations

Rockefeller University





Rockefeller University

over and under the benches, in closets, on walls and in every room,” says Hudspeth. To lighten up the cabinets over the benches, he opted for a glazed window instead of a solid door, which allows light to bounce around. His team can also see what’s inside without opening and closing the door, speeding the search for specific items.

## 6 Lighten up

Poor lighting is a common problem that Alfieri deals with during renovations. Whether it’s a windowless lab or harsh overhead lights, lack of proper light increases fatigue and strain.

Even though Hudspeth’s new lab is located in a basement, half of the wall is aboveground and has windows, which remain uncovered to maximize light.

“There’s not much of a view, but we notice an elevating feeling during the day when the sun is out,” says Hudspeth. Allowing in natural light from windows gives a psychological lift, because it provides a sense of day and night and of the changes in the weather. Hudspeth also modernized his overhead lighting to be brighter and more even—without being harsh—by using state-of-the-art LED bulbs. Adding tabletop lamps is another way to improve lighting, according to Alfieri, but safety concerns limit their utility in high-traffic areas and bench areas with lots of liquids.

## 7 Plug and play

“Most people don’t anticipate the right number of electrical outlets for their lab and end up using those cheaters—the [devices] you use in your apartment to split two plugs into six—which may not always be the safest option,” says Alfieri.

Researchers often end up with dozens of

small pieces of equipment that need to be plugged in for use. Hudspeth has learned over the years to put in more electrical outlets. During the most recent renovation, he specified a duplex outlet with two plugs every 18 inches at counter height, which is a lot of plugs, compared to most standard offices that have only a set of four plugs on each wall.

“When I first specified this, the electricians look at me like, you know, ‘Are you kidding?’ But, in fact, if you go and look at the lab and count them, we end up using most of them,” explains Hudspeth.

## 8 Seek sustainable changes

According to Alfieri, conservation is a growing concern among researchers. Take water use, for example. Different experiments require different quantities of fresh water, some of which are very wasteful. Some experiments call for turning on the tap and letting the water run down the drain. If that runs for several hours, it wastes many gallons of water. One solution is to use a water recirculating system with a chiller and a pump, which allows water to be reused safely.

Another source of waste is the ventilation system. Alfieri explains that most ventilation systems bring in fresh air from the outside, condition it to temperature and humidity and then immediately eject it back outside. There’s no recirculation, and it’s very wasteful. “We use different strategies to recapture the temperature or the heat that’s embodied in that air before it goes out of the building,” says Alfieri.

“Intelligent lighting reduces electricity consumption,” says Robert Skolozdra of the architecture firm Svigals+Partners, “such as motion-sensors that turn lights on when someone enters the lab.”

## 9 Boost security

Some labs require very tight security, especially if researchers there work with human subjects. There might also be patent or proprietary issues, in which case researchers need to be very careful about who sees the research that’s being done in the lab. According to Alfieri, improving security is reason enough to renovate a lab space, especially if it’s necessary for meeting funding requirements or other regulations.

“Cabinets with locks keep disposables from disappearing in increasingly popular open floor plan labs,” says Victor Cardona of the architecture firm SmithGroup.

## 10 Inspire art

The entry to Hudspeth’s lab is a long, narrow hallway in the basement. Before the renovation, it defined drab. So Hudspeth decided to replace a dismal entryway with an art mural.

Hudspeth passed examples of his research—papers, text books and electron micrographs—to former graffiti artist and professional painter, Robert ‘Coco 144’ Gualtieri, who now works on campus as an electrician in the engineering department. Gualtieri incorporated themes from work going on inside the lab into a twenty-foot-long painting depicting hair cells, mathematical formulae and research animals.

“After two months of painting,” says Hudspeth, “we had an unveiling party with champagne and people from around the university. At the same time, we dedicated the new lab. It was really inspiring.”

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