Clinical Laboratories

HermanMiller Healthcare

Thinking about labs:

As point-of-care testing increases and as diagnostic science and technology advances, clinical labs will function as the quality control and central interpretation station for diagnostic testing.

While the front-end testing becomes more portable, the back-end analysis will operate within a highly technical and flexible work center. Staff size, training, required skills, types of equipment, and facility layout will all be impacted.

Herman Miller Healthcare has always been an advocate for environments that adapt to change. As we enter new worlds of diagnostic testing and processes—including molecular platforms and integrated electronic records—the where, when, how, and what of laboratory work and the places in which it happens will require changes, too.

We offer choices that help you make sound decisions on how you work today and how you will continue to work in smart and efficient ways tomorrow.

We would like to help you create and build a laboratory environment that adapts to what comes next.

Using a group of standard-sized products creates a flexible lab now and into the future.

Mass customization or a standards-based approach?

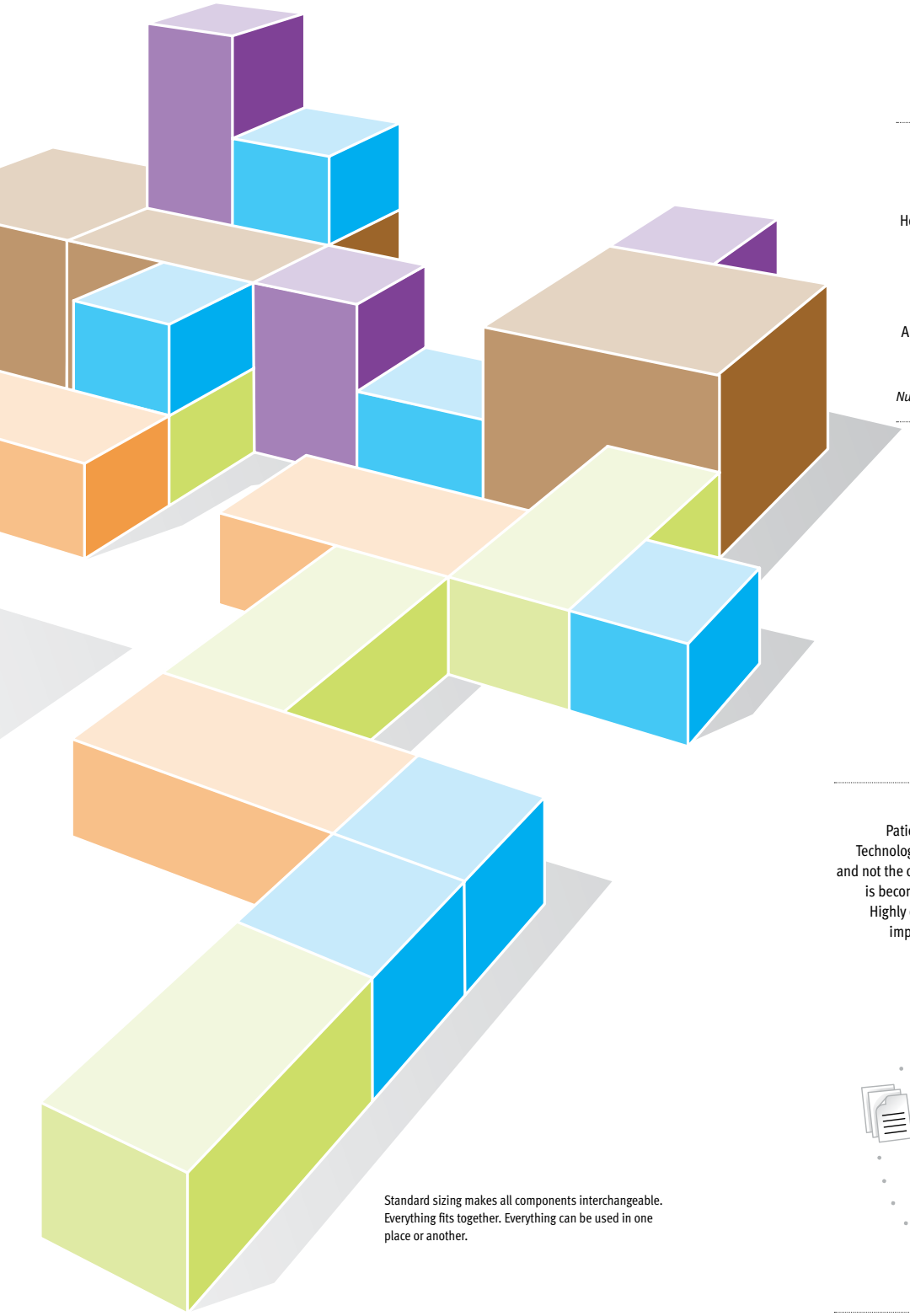
A standards-based approach doesn't mean a cookie-cutter result.

Modular lab products, with an offering of components in standard sizes, have benefits over a customized lab application. Our lab system was designed with a coherent dimensional logic. Standard sizing makes all components interchangeable. Everything fits together. Everything can be used in one place or another, without adding to the list of sizes and parts. The result: lots of options within a set of standard-sized parts.

What's the benefit over customized or built-in casework?

Future cost. One change to a custom lab and it's start-over time for your initial spend. First dollars will only ever be first dollars. A modular approach allows you to reconfigure portions or the whole of your lab and reuse most, if not all, of the original product. First dollars turn into long-term value.

Change. One change to a custom lab and it's start-over time with your products. There is no such thing as non-disruptive or incremental change when your products are built in. Modular products, with their systems logic and flexibility, allow you to make changes large and small, using the same products or adding some new ones to an existing application.



Standard sizing makes all components interchangeable. Everything fits together. Everything can be used in one place or another.

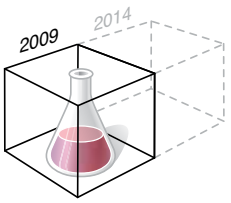
BY THE NUMBERS

6.8 million tests performed annually, with revenues exceeding $50 billion

Hospitals comprise the majority of revenue:
hospitals: 55%
commercial labs: 32%
physicians' offices: 8%
other: 5%

Approximately 20,000 pathologists work in the U.S. About 80% work in community practices.

Numbers apply to clinical lab services in the U.S.



75 PERCENT

of lab interiors are completely renovated at least once every 5 years.

POINT-OF-CARE TESTING

Patient-centered versus department-centered: Technology enables lab tests to come to the patient and not the other way around. Processing and analysis is becoming the primary activity of the lab facility. Highly efficient and highly productive labs are an important part of a patient-centered hospital.

Reserve the right to change your mind. Because the perfect lab today won't be the perfect lab tomorrow.

Design the ideal lab layout for now and be prepared to adapt as processes, technologies, and equipment change. No need to tear out and start over. Modular, flexible lab products adjust whenever and wherever they need to—without significant cost or disruption.

- Support choices
- Surface options
- Mobile modularity
- Flexibility to adjust
- Power, data, utilities
- Storage choices

Create an adaptable lab that keeps changing along with your lab operations.

Choose based on need.

Not all furnishings within the lab need to carry utilities or support heavy loads. Each of our **support choices** provides appropriate solutions for different areas and functional requirements within the lab environment. We offer four options for structural support: freestanding modules, freestanding panels, demountable walls, and wall-attached support.

Several **surface options** let you target specific areas with the materials best suited for them. Laminates, Corian, stainless steel, resin, and Chem-surf are all offered. You can also support heavy and large equipment with heavy-duty surfaces.

Consider **mobile modularity** one of your best Lean tools. Move equipment or processes to exactly where they add the most value—and eliminate the most waste. And because they are part of a modular system, components work with mobile tables as well as all support structures.

Adjust from bottom to top.

Our lab system gives you the ultimate **flexibility to adjust** any and all storage and surface components. Storage and shelves below the primary work surface can be positioned inches above the floor to hold large equipment.

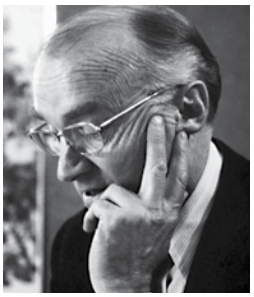
Stacking shelves and storage components vertically uses space efficiently and gives you flexibility to plan an ergonomically considered layout—especially when components adjust in one-inch increments anywhere along the support structure. Stacking components along the lab periphery and under surfaces also maintains visibility throughout the space.

Access where you need it.

Connecting to and accessing **power, data, and utilities** shouldn't dictate decisions on where and how you want to position equipment and furnishings. Wire chase rails throughout the lab space make equipment and computer placement more flexible. Modules have a seven-inch core capacity to carry medical gases, plumbing, power and data, and ducts for exhaust. Ceiling, floor, and wall access can all be accommodated.

Make a storage plan that doesn't close you in.

Storage choices include open or closed shelves, cabinets with clear or solid doors, and drawers in a variety of colors and sizes. Create a lab with open vistas and keep storage relegated to below surface height or in a central storage area.



Adaptable, Flexible, Dynamic

Robert Propst, designer of the Co/Struc® system (as well as Action Office®, the first-ever panel system), defined the objectives for the lab products he was adding to the Co/Struc line in this way:

- serve the dynamic tasks of the laboratory with dynamic equipment
- user changeable to meet needs
- major cost reduction over conventional laboratory casework

Propst expressed these objectives nearly 40 years ago. Today, we still talk about the importance of dynamic labs. Flexibility is essential to operating a cost-effective and efficient lab because change is a reality. Consider the speed at which diagnostic technologies are being introduced and equipment is upgraded and replaced.

Forces and Trends Impacting Change in Hospital Laboratories

The last full-scale report on labs, published in 2002 by the Center for Health Design's Research Committee (formerly Center for Healthcare Environments Research), focused on change. Here are some results from the report.

Four forces that impact change were identified by lab managers and directors

Lab managers and directors identified four main forces of change and the issues that they'll need to address as a result of change. Labs that are outfitted with modular and flexible products can respond to the pressures and requirements that these lab managers face much better than static built-in products. Propst was right on the mark when he stated, nearly 40 years ago, that labs were dynamic places that required dynamic equipment—including furnishings.

1) Need to Reduce Costs or Increase Revenue

- change core services
- change STAT services
- increase outreach
- refer more tests off-site
- decrease staffing (downsizing)

2) Need to Improve Operational Efficiency

- decrease turnaround times
- fill staff vacancies and availability of qualified staff
- reduce errors in testing and reporting
- benchmark lab systems
- reengineer workflow

3) Regulatory Requirements

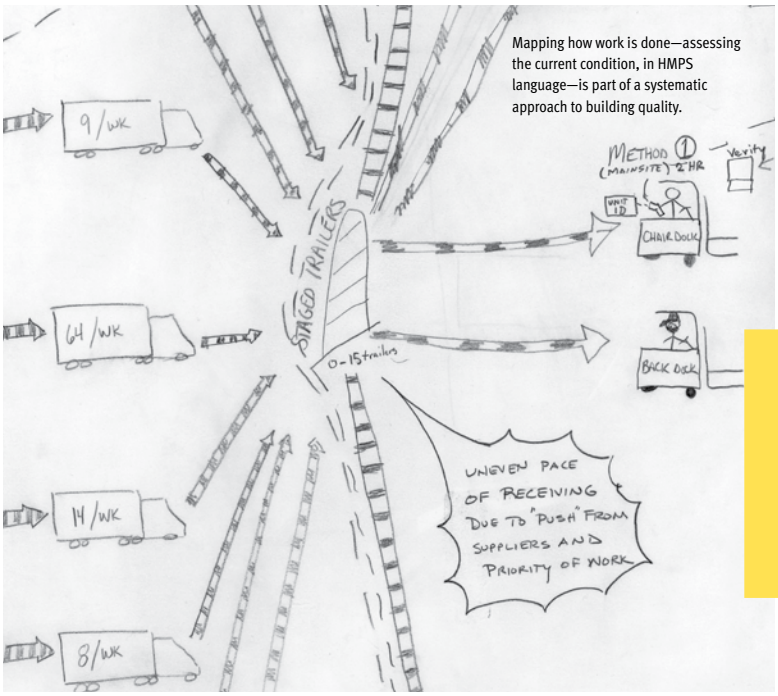
- life safety codes (OSHA)
- building codes (NFPA, BOCA)
- accreditation agencies (JCAHO, CAP)
- state or local codes/regulations
- federal regulations (CLIA 1988)

4) Changes in Healthcare Practices

- merge or consolidation of lab
- changes in the percentage of HMO business
- added or subtracted medical practices
- shift in patient demographics
- shift of services to outpatient setting
- added or closed hospital beds
- increased point-of-care testing
- joint ventures with outside lab
- support services (call centers)
- increase of physician-owned labs

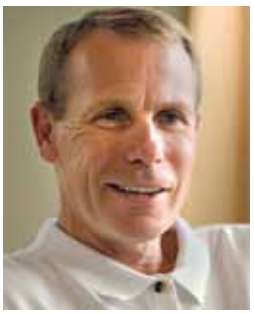
Source: Nature and Rate of Change in Clinical Laboratories, Final Report (Nov 2002), Dina Battisto, David Allison, Architecture+Health, Clemson University; sponsored by the Research Committee, Center for Health Design.

Co/Struc height-adjustable workstation: a completely mobile work and storage area



Mapping how work is done—assessing the current condition, in HMPS language—is part of a systematic approach to building quality.

Driving Improvement
The Herman Miller Performance System



Ken Goodson, Executive Vice President of Operations

Herman Miller's introduction to Lean thinking began in 1996, when a relationship with automaker Toyota's consulting group was initiated. Herman Miller is still the only furniture manufacturer to be selected by Toyota to learn and implement the Toyota Production System (TPS). The unique relationship continues today.

We talked with Ken Goodson, Executive Vice President of Operations, about Herman Miller's Lean journey and its Herman Miller Performance System (HMPS). Goodson has been involved with Toyota since those first days and continues to lead the work of continuous improvement at Herman Miller.

What are some of the core principles of the Herman Miller Performance System?
There are several things that are important to HMPS thinking. It's about taking little things and making them better for our employees and our customers. There's a story I like to tell that illustrates this point. An employee was having some difficulty doing his work. We analyzed how his job was performed, whether the work area was laid out well, and concluded that if we moved a screwdriver two inches on the production line, the ergonomics for this individual would be improved greatly. It took us two days to analyze and make that change. A lot of people would find that to be a ridiculous waste of time, but we didn't. What's right is for us to be able to focus on how to improve the safety and well-being of our people. And when we improve the quality of what our employees are doing, we add value for our customers. That's core to HMPS thinking.

Another important aspect of the HMPS process is flexibility. Nothing is fixed. Nothing can be fixed. We may change something this week and change it again next week because conditions change…and they should. Things change quickly—technology, equipment, different attitudes, different ideas—and something is generally different today than it was before. We need to remain flexible in what we do and in our work environments. So we don't fix anything; we don't bolt things to the ground and believe they are there forever.

> "HMPS is helping us to continue building an innovative organization. We are always asking, 'How can we do this better?'"
>
> Brian Walker, CEO, Herman Miller, Inc.

Our Aeron® chair line is a good example of this flexibility. When we first started producing Aeron chairs, our process was different than today. We worked in a cell environment where ten people each assembled a complete Aeron chair. They'd each build one from the casters up. We've changed that process to an assembly line one. When we made the switch, the folks who'd been assembling the Aeron chairs came to me and said we were making a mistake. They felt that their way of each building a complete chair was more efficient and that we couldn't improve on the process they'd already created. Well, we couldn't make 1,000 chairs a week with that process. Today, we make 20,000 chairs a week using the assembly line process. And our quality is improved.

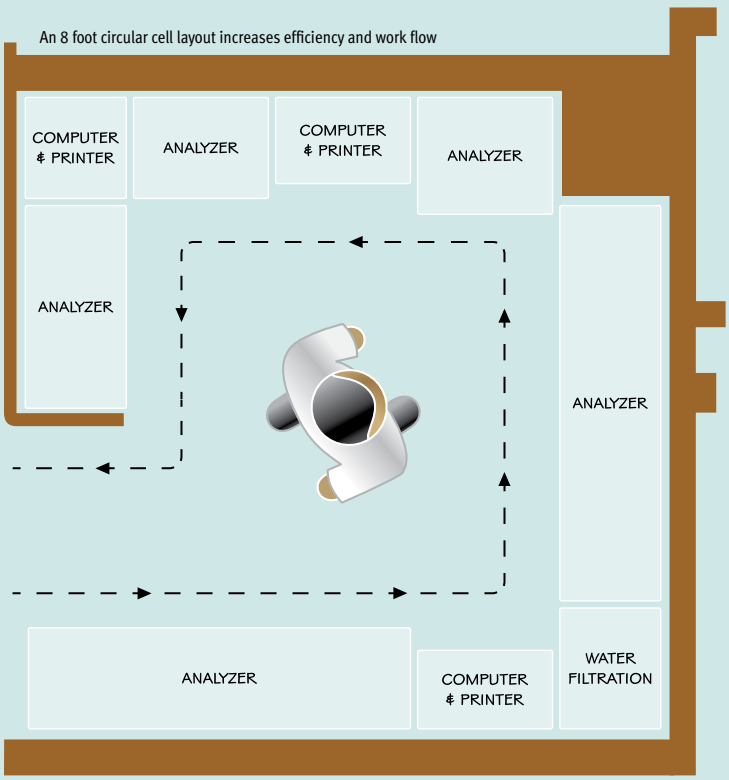
The Aeron chair line is in its third generation. But we continue to revisit the production process. We may go back and adjust it because conditions change. We don't let things rest. It's a mistake to build fixed processes and environments and believe that they should stay one way forever.

HMPS has been part of the company since 1996, yet you continue to describe it as a journey.
Whenever we talk about HMPS, we talk about it as a journey. It's a journey of continuous improvement, of trying to make something better than it was. We change constantly. We look at things today differently than we did yesterday. We will learn something tomorrow that we didn't know today, and we make changes as a result. That's the journey we are talking about. Does it end? It really doesn't. We are constantly improving on what we are doing, and we will always be on that journey.

Applying Lean principles to the design of a clinical laboratory

The Herman Miller Healthcare Design team helps customers solve their problems every day. We talked with members of the design team about a recent lab project. We also checked in with the lab director to get her thoughts on the space, on Lean processes, and how the lab has been working for the staff.

A clinical lab, situated within a Midwestern hospital, was able to increase its capacity and streamline work by introducing a one-piece flow design and layout. One-piece flow, a term associated with Lean manufacturing, streamlines processes, keeps all supplies and tools at hand, and reduces travel. The idea is to eliminate the things that don't add value.



An 8 foot circular cell layout increases efficiency and work flow

Our design team comments

Instead of designing a linear work process, we arranged part of the lab in an eight-foot circular workstation. Eight feet is becoming a standard dimension, based on distance to travel, access to equipment, etc. A cell may also contain automated equipment. Core lab areas will typically contain one or two cell work areas.

Here's how we approached the work flow within this cell lab design: Samples come into the cell area. It contains refrigerators, equipment, tools—everything needed to process the samples. Once samples are processed, they are moved back out of the cell for analysis. We've created an efficient layout in terms of work flow and space utilization.

One of the important aspects of this lab's reconfiguration is that we took it from a linear bench layout to a circular cell layout using the same modular lab furnishings. A small portion of products was added to the mix, but the majority was reused. That saves big dollars. In addition, the staff is familiar with the products and how they move and adjust.

Our customer comments

Our new lab has been in operation for nearly two years. The redesign was driven by implementation of Lean processes throughout our organization's lab system. And the space itself was in need of updating—we'd done no major remodeling for over 30 years.

We went from a lab with individual rooms and bays separated by full-length walls to a completely open lab space. The layout has given us more efficient paths for passing samples through the lab. In the center of it all is our specimen processing area (we call it our SPA). Pneumatic tubes and a dumbwaiter deliver samples to the SPA. From there, samples are directed to specific areas for processing.

Modular solutions enable a lab to more easily and quickly refresh and update. That's critical for high-change environments such as clinical labs.


Lean Healthcare

APPLYING HERMAN MILLER'S EXPERTISE TO IMPROVE OUTCOMES

The U.S. has the most expensive healthcare system in the world, yet "experts agree that it is riddled with inefficiencies, excessive administrative expenses, inflated prices, poor management, and inappropriate care, waste, and fraud."

Read "Lean Healthcare" at HermanMiller.com/laboratory

The open floor plan has really improved awareness among the staff. People see what others are doing. The communication is better, and we have much better teamwork. A bench tech can see that a phone needs to be answered, for example, and tends to it. We've always cross-trained our staff, so this open system works very well for us. Improving on visual cues extends to a tracker board that's visible to everyone in the lab. It keeps track of specimens and process times. Everyone is aware of what's going on and where they are needed.

The new lab is so much more efficiently laid out that we've been able to use what had been lab space for other purposes. We now have a storage room, which has cleared out shelf space and clutter within the lab. It's easier to see things now that we have moved supplies to the storage room. We also created a staff break room and conference room.

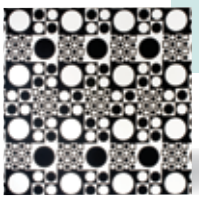
And another plus is our modular furnishings. We've already redesigned part of the lab. Even though it was less than two years old, we had to change instruments and that required changes in our layout. Our lab is mobile. Everything is adjustable, which helps us rearrange the lab when we need to.

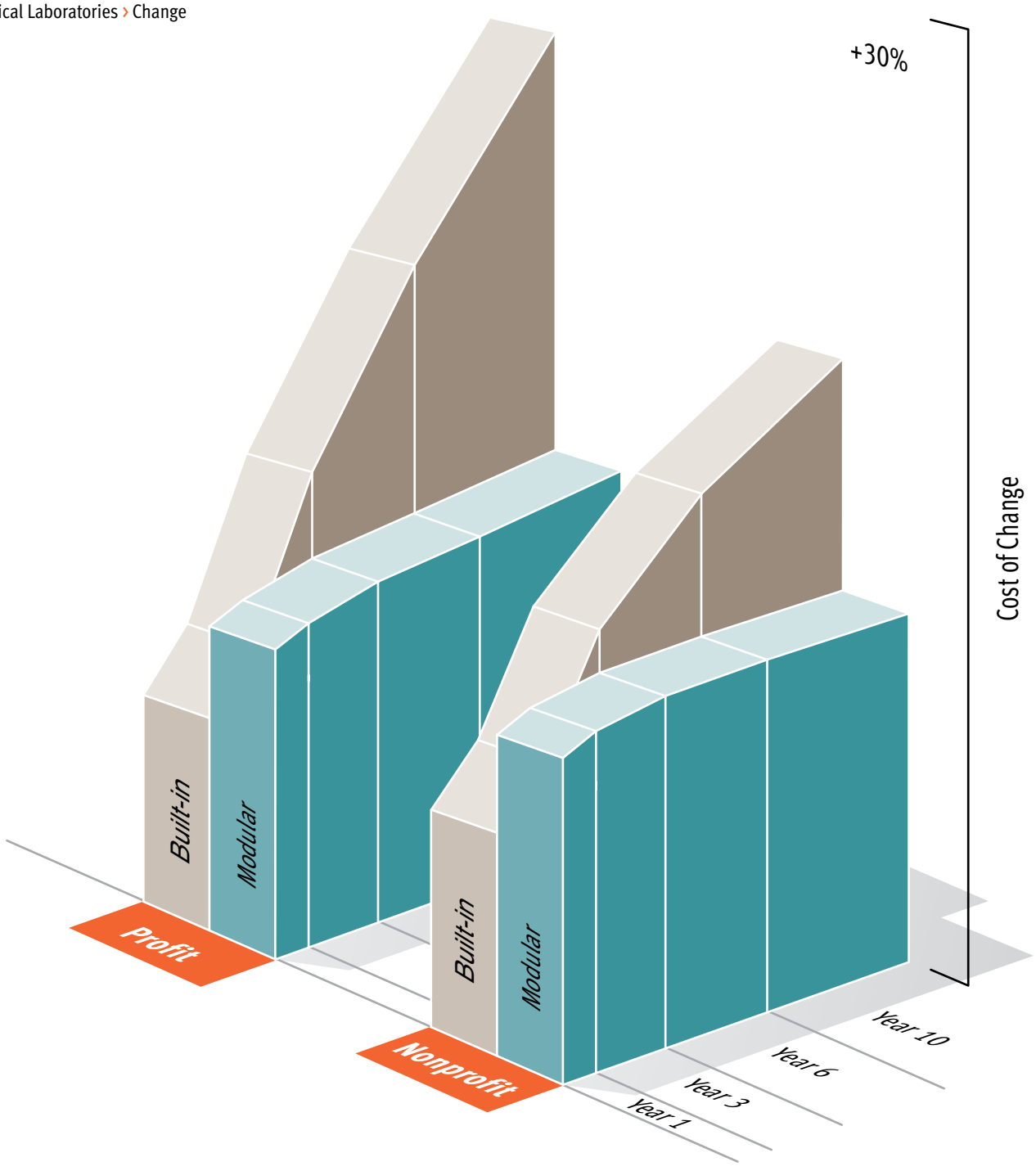
We've learned a couple things about operating a lab with an efficient and open layout. First of all, having equipment concentrated into a smaller area generates more heat than we had anticipated. We put in a portable air conditioning unit. We've heard from a number of colleagues that they are also doing this. Second, an open lab is a louder lab. Concentrated pods of equipment increase noise levels. So do the sounds of staff members in an open environment. We installed a number of fabric-covered tackboards, which help to absorb sound. [See "Considering Noise Management in Labs"].

Lean thinking helps to improve processes and reduce waste because the staff focuses on continuous improvement. Problems are identified and acted on—so are good ideas. A Lean lab is a continuously improving lab.

Considering Noise Management in Labs

- The 2010 version of the federal Guidelines for Design and Construction of Health Care Facilities includes a chapter on acoustics. This first-ever appearance of this topic in the Guidelines signals the increasing recognition that noise affects both patients and staff. We should recognize the impact of noise on anyone doing highly cognitive work. For laboratory workers, noise causes distractions, which can lead to errors, add to the stress of a work environment, and, at relatively low levels, can cause hearing loss.
- More technology and automation, electro-mechanical pneumatic machines, and CPU fan noise can create a fairly high decibel level—much higher than a typical business office.
- The focus of most lab designs has been on cleanability, which means lots of hard surfaces. These add to the reverberation time of a space, which compounds a noise problem.
- While we have seen carpet used to quiet the lab, the best intervention is to install the highest level of acoustical ceiling you can. But suspended horizontal elements are problematic as they become dust catchers. Vertical elements, such as Herman Miller's RoomTune® sound-management products, can be effective in reducing reverberation time and noise. These sound-absorbing panels and tackboards can also be easily relocated to adjust the acoustical properties of a space as it changes over time.


RoomTune® panel, from Herman Miller



The Cost of Change

The financial case for modular lab furnishings

When you consider the rates of change labs experience—some reports suggest over 30% annually—modular lab furnishings make a compelling financial case over built-in furnishings.

The life-cycle model at the left considers the cost of change over 10 years for a nonprofit lab and a for-profit lab. Our model is based on a small 300-square-foot lab with a conservative annual change rate of 10%. We then compare the costs of reconfiguration and installation when that lab is outfitted with modular furnishings or with built-in furnishings.

> Built-in lab furnishings will work well… once. But as soon as you need to make a change, you're starting over.

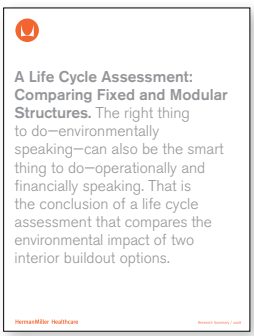
Cost to purchase new modular or built-in product is about the same. The cost to install will vary, as installation costs are part of the purchase price of built-in furnishings. Our model assumes a 10% installation cost for the new modular product.

Our lab, now furnished with either modular or built-in furnishings, is fully in operation. But at some point down the road—and perhaps not long after move-in—a change requires the lab to be reconfigured. Change could be driven by a new piece of automated equipment added to an existing track; it could be a reduction in the square footage of the lab; or it could be that an entirely new process and testing area is being introduced into the lab.

Redoing the modular lab will require a purchase of about 5% new product—since existing products can be reconfigured—and an install cost. Redoing the built-in lab will require 100% new millwork. Add in 20% demolition fees and landfill waste fees for the existing millwork, and the cost of change between the modular furnishings and the built-in approach begins to veer in two different directions.

Consider how a 10% change rate plays out over 10 years.

Cost avoidance comes quickly when operating a modular lab. By Y3, the for-profit, built-in lab costs nearly 9% more than a modular one. By Y6, it has cost almost 25% more, and by Y10, it's 40% more. The nonprofit, built-in lab has spent 32% more than a modular one by Y3, over 60% by Y6, and 79% by Y10. This is a big difference when you consider the financial impact of change. Modular furnishings make a positive impact—both in terms of your budget and your lab's effectiveness.



The right thing to do—environmentally speaking—can also be the smart thing to do—operationally and financially speaking. That is the conclusion of a life cycle assessment that compares the environmental impact of two interior buildout options.

Read "Life Cycle Assessment" at HermanMiller.com/laboratory

Respond to change with adaptive lab solutions

Our lab customers demonstrate how flexible lab applications help them make necessary changes—and improve performance and costs.

El Camino Hospital
Silicon Valley, California

Reconfigured existing modular lab products to manage automated equipment, workflow patterns, and turnaround times.

- Increased lab results by 40% with the same staff and same space.
- 85% of existing product used in reconfiguration—estimated savings of $180,000.

CSSS Richelieu
Yamaska, Quebec, Canada

Designed new 19,000-square-foot lab to include robotic equipment. Before installation was complete, a larger-than-expected machine arrived.

- Reconfigured modular lab products to accommodate the new machine—in just 15 minutes.

HermanMiller Healthcare

For nearly 40 years, we've been providing our customers with adaptive healthcare environments.

When you choose Herman Miller Healthcare, you'll be partnering with a company that offers more than excellent products. We're a company you can trust to develop the best solutions for you. Our team has the knowledge and experience to help you sort through the complexities of designing and creating healthcare environments. Our experts in lab design and process flow assist in all aspects of your project, from initial planning to specification.

A ten-year warranty is our promise to you that our products will withstand the rigors of a 24/7 operation and keep your environment flexible, efficient, and hard working.

HermanMiller.com/laboratory