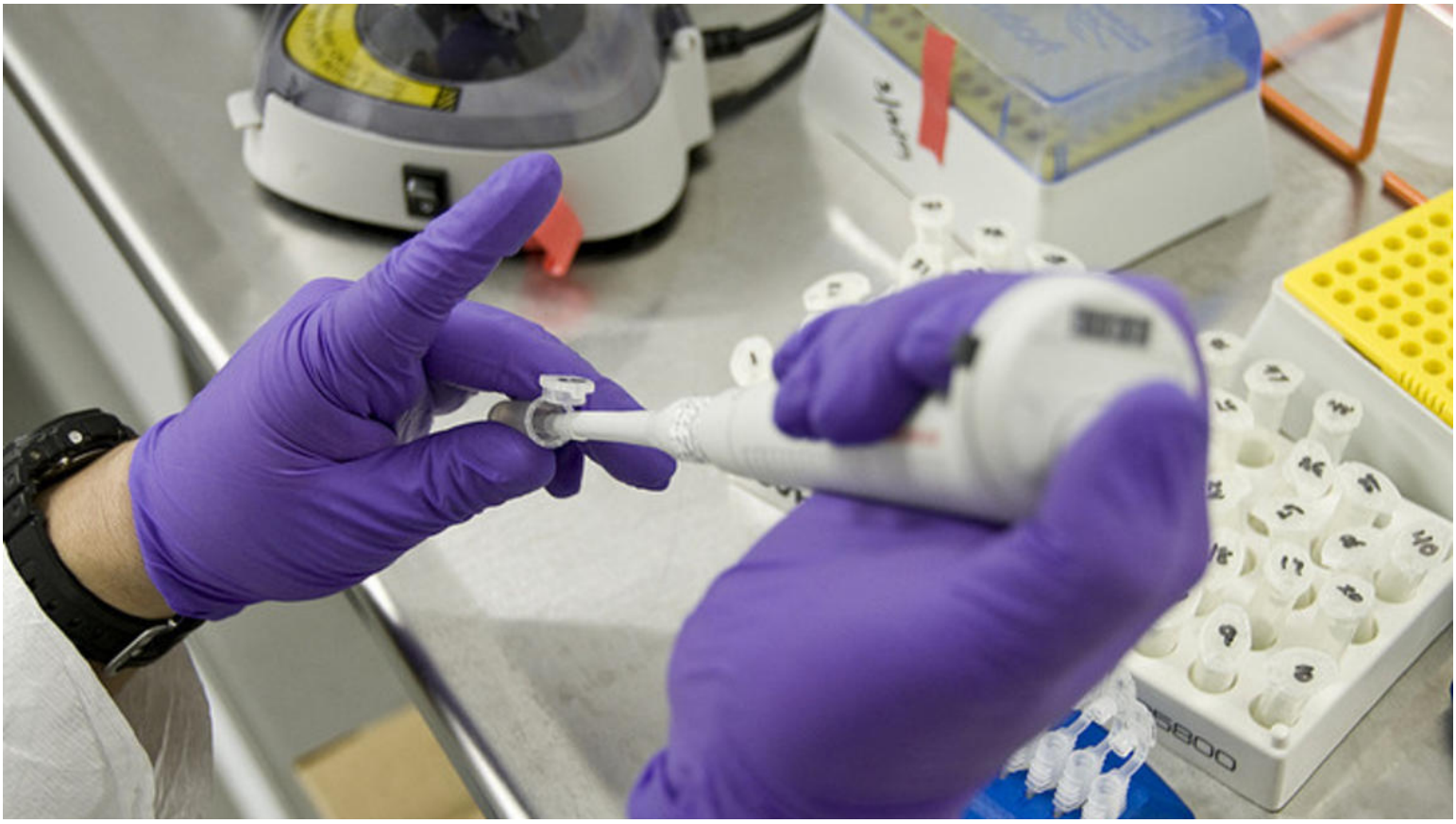
DECODING DESIGN

A HOSPITAL LAB'S BIGGEST TEST: THE 'PLUG AND PLAY' BUILDING



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POSTING IN **DESIGN**

LAB TECHNICIANS ON THE FRONT LINE DESIGN A EFFICIENT BUILDING THAT CAN KEEP UP WITH FAST-CHANGING

(http://i.bnet.com/blogs/smartplanet_labgloves_81213.jpg)

(http://i.bnet.com/blogs/smartplanet_labgloves_81213.jpg)Karie Sceiford, a lab technician at the Cleveland Clinic, used to read her pedometer at the end of an eight-hour day, and it often reported that she had taken 10,000 steps. "That was just to get my job done," said Sceiford, who works on testing for autoimmune diseases such as lupus and rheumatoid arthritis. "It was a lot of travel time." It wasn't unusual for Sceiford to leave her workbench for several minutes at a time every time she needed supplies or access to a piece of equipment.

And while the laboratory's administration might not have known Sceiford's step-count at the time, they understood that -- other than calorie-burning -- nothing good comes from extraneous travel in one of the country's busiest hospital labs. So when it came time to design a

new laboratory that could adapt to a fast-changing industry -- with the goal of becoming an even bigger player in the global diagnostic testing arena -- the hospital took the unusual step of turning to lab techs like Sceiford for advice. Designing from the bench out gave a voice to those on the front lines who use the space every day, and that process yielded a significantly more efficient space.

The resulting $75 million, three-story lab, which opened in 2012, primes Cleveland Clinic Laboratories to become a leading national reference laboratory -- the type that performs many of the specialized tests that regional hospitals aren't equipped to do on their own. It houses labs with the greatest growth potential, such as microbiology and infectious diseases.

With that expansion in mind, the new space was created with extraordinary flexibility so it can grow as business increases and technology changes. No matter what new machines arrive and what power they demand, it will be a cinch to get them up and running; as one executive explained it, it's "plug and play."

But for Sceiford -- and the team that collaborated for the design of the new space -- one of the first steps involved something so low-tech that I did it in my own house before a kitchen renovation: taping out the ideal workspace on the floor.

Building for bigger business

The buildings of the Cleveland Clinic are spread out on the east side of Cleveland like a university campus; on a chilly spring day, I spent a

good 20 minutes walking through tunnels, stairwells and long hallways to get from one office to another. Aside from the main campus, the non-profit health system is comprised of more than 75 outpatient locations in Northern Ohio, plus centers in Florida, Las Vegas, Canada and soon, Abu Dhabi. Last year, there were 5.1 million outpatient visits throughout the system. On the laboratory side, specimens arrive on campus from around the world -- from both Cleveland Clinic hospitals/health centers and unaffiliated facilities -- for diagnosis.

The existing laboratory, built in the '70s, was clearly in need of an upgrade. The idea was for the older lab to processes more routine tests, most of which are automated, while the new lab would handle the esoteric tests that are likely to attract new business.

But Dr. David Bosler, head of Cleveland Clinic Laboratories (CCL), said it's very unusual, in the age of health- care reform, for a hospital to invest in a brand-new lab building. "The release of capital to build this lab was justified by the expansion of the reference laboratory," he said. Bosler noted that the reference lab sector represents a potentially significant increase in business for the hospital. He said growing that business is "tremendously important. It's a source of financial diversification, but also, when you grow the reference laboratory, as more volume comes in, it shifts the equation about whether to bring a new test in-house. More volume justifies that, and you move further out onto the cutting edge, and that benefits patient care."

Laboratory tests are an important part of diagnosing and treating

disease -- from something as common as the flu to a rare autoimmune disorder. CCL can carry out more than 2,000 different tests; in comparison, some other large hospital labs might offer only a few hundred. Annually, CCL processes 12 million tests; through selling its expertise, it plans to grow that number by 4 or 5 million tests per year by 2018. (An example of that growth: This summer, a large laboratory in the Great Lakes region partnered with CCL, which will be the lab's main provider of specialized testing and diagnostic services.)

Bosler said certain areas of testing are primed for growth, including some cancer therapies and personalized medicine. He said in finding the right treatment for an individual, the cost of lab tests (i.e. testing a person's antibodies) is considerably less than the cost of pharmaceuticals. This approach not only helps avoid giving patients drugs that may ultimately harm them, but it shortens the time to diagnosis.

Design from the bench out

In the early stages of designing the new lab, 67 technicians participated in a series of workshops. They used what is known as lean design method, a tool that originated from the study of the Japanese auto industry, in an effort to improve productivity and quality and reduce errors. The idea was for participants to focus on improving efficiency by reducing the distance between them and the items they needed to do their work. The "optimal work window" was a 5-foot radius around each technician.

"The question is, can you take Japanese lean management practices

into U.S. organizations?" said Leonard Greenhalgh, professor of management at the Tuck School of Business at Dartmouth. "It only works when you involve people who are affected by decision-making in the decision process themselves. We've found that the best people to redesign a workplace are the people who use it."

Greenhalgh said the cost of inefficiency among U.S. companies is staggering, but as businesses shift from an outdated military-style management system to one that involves the workers, there is a movement toward higher productivity and increased satisfaction. "It's counter to the old style," he said. "But the people at the lowest level of the organization are the ones who best know how to reduce waste."

In her first two-day workshop, Sceiford depicted her movement during a workday in the existing lab in a line-filled drawing called a spaghetti diagram, which makes it easy to see one's footpath and wasted travel steps. In that scenario, she was constantly needing to replenish inventory, which was done in two places, on opposite ends of the building. She'd have to swipe out of the lab, swipe into the inventory supply room, grab the limited amount she could carry, then swipe back into the lab. She knew there had to be an easier way.

Next, workshop facilitators asked Sceiford to draw the ideal scenario, illustrate it on the floor -- life-sized -- with blue tape and go through the motions of her daily tasks. She acted out things like going to the printer, retrieving supplies, putting a specimen in the incubator and using the sink.

"It was like a child doing imaginary play," Sceiford said. "And it was

huge to realize there were other ways of doing things. You come into work and do what you've always done and what everyone else does. And you don't always think about things you're doing that are a huge waste of time and how you could be doing it differently."

The first round of technicians' diagrams showed that 38 percent of their tasks were located outside the optimal window; the ideal-scenario round reduced that to just 9 percent. The latter became the major source of input for the design of workstations in the new laboratory. Perhaps one of the biggest lessons learned was the need for a new inventory management system.

"I think the idea of starting with the workflow of the tech at the bench and working out from there --where freezers are, where the equipment is -- I think that's pretty revolutionary," Bosler said. "I don't know other groups that have done it that way. There are certainly new and fancy labs, but this is unique."

A building with a long shelf life

Specimens arrive at the new building three different ways -- zipping across campus through miles of pneumatic tubes; pulling up in a FedEx truck; and walking in the door, hand-delivered by a courier. Joe Seestadt, interim administrator the Robert J. Tomsich Pathology & Laboratory Medicine Institute (RT-PLMI), said the couriers were helpful in providing input for the design of their entry area, which provides a loop for them to drop off the specimen, scan its barcode and exit quickly.

"I'll walk you through as though you were a specimen," Seestadt said, leading me through sliding doors into a vestibule just outside the lab. There were shelves of about a dozen red and blue Playmate coolers. After couriers drop off a specimen, which might be frozen or refrigerated, they can fill up on ice.

We walked into the blindingly bright, naturally lit, 135,000-square-foot lab. "At all times, you know where the specimens are," Seestadt said. "You never want to misplace a specimen." He stopped in front of a workstation in the central processing area where a tech in a blue jacket was scanning barcodes of specimens that had arrived through the pneumatic system then placing them on a cart. From there, specimens are processed, put on slides, incubated and tested.

At the end of each workbench, I saw racks of supplies -- things that techs use daily, like pipettes, glass slides and microscope bulbs. Every day, an inventory coordinator comes by with a handheld scanner, scans the inventory barcodes and determines how much to replenish from storage, long before the technician has to take time (and steps) to search for anything. In a more central location, refrigerated items lined up on shelves of tall coolers, like Gatorade bottles at a 7-Eleven. The lab was quiet, except for the humming of machines in the background.

Dr. Kandice Kottke-Marchant, chair of the RT-PLMI, said hiring inventory coordinators was a big part of the planning. "It's like Wal-Mart," she said. "They could make sure the shelves were stocked every day. We said, 'No more than a two-week supply at your bench.' The techs were really concerned. A year later, that's what they like the best."

In the old building, which was divided into rooms, walkways were helter-skelter, the lighting was artificial, and it was difficult to see beyond the adjacent workspace. In the new building, the space is wide open. The elimination of overhead storage allows clear lines of sight so managers can see technicians working, and inventory coordinators can walk down long aisles, delivering supplies like postal workers stopping at mailboxes.

Labs have special infrastructure needs, things like freezers, vents, backup power and distilled water. But the building was designed with the utilities -- the most expensive part of building -- located in large columns (with accessible panels). That makes it relatively easy to change the configuration of a workspace and power lines without digging up the floor.

One of the hallmarks of this LEED-certified building, which operates 24/7, is that it's ready to grow -- flexibility was paramount in design, and the space could eventually double in size. Workbenches -- modular with storage units on wheels -- can be easily reconfigured for a new test or additional piece of equipment. "Nothing is fixed to the ground," Seestadt said. Since it opened, managers have already added new equipment, relocated freezers and moved some workstations.

Much of the change comes from increased automation, with the goal of processing specimens more quickly to improve patient care. The faster the lab can correctly diagnose a virus or infection, the sooner a patient can begin treatment -- critical in potentially fatal cases, such as meningitis.

One new machine, for example, identifies organisms in a fraction of the time it previously took, with fewer opportunities for error and less biomedical waste, at a reduced cost. In the future: a move to digitize slides and set up cameras in incubators so a technician can sit at her desk and look at the image on her computer monitor.

Walking through the lab, it's clear that there is much growth to come. A number of workstations sit unused, as does a new specimen-tracking conveyor belt that encircles a couple work areas like a model train track.

"The thing that's great about the building is that it has a long shelf life," Bosler said. "What's hot now is not what was hot five years ago. That’s incredibly important to understanding the benefit of a flexible laboratory, being able to reconfigure the space without a big investment. I think of it as an ace that you have in your back pocket."

Better productivity, attitudes

It's been 18 months since the new laboratory opened, and not only is it proving more efficient, but Kottke-Marchant said technicians' attitudes have improved. Renovation of the old lab building, based on a similar design process with the techs, will begin in October.

Sceiford doesn't wear a pedometer anymore, but she did when she first moved into the new lab, and it showed she was walking 6,000 steps a day -- 60 percent of what she had logged to get her job done in the old building.

"I am definitely more productive," she said. "We've had increased

volume, and we're getting more specimens accomplished in a day than we used to." She said change would have happened either way, but she is thankful to have been included in the process. "That made it a little easier to adapt, rather than them just saying, 'Here is your new space, and here is where [we are] going to put your stuff.'"

"The beauty of this process at the Cleveland Clinic is that you've got people feeling heard," Greenhalgh said. "It matters what they think and how they are doing their jobs, and it produces a psychological climate that improves morale and company loyalty. It's not rocket science. When it's their idea, they go the extra mile to make it work.

There is, however, one downside to the new space. Without all that walking, Sceiford said, "I have to watch what I eat."

Photo: Flickr/U.S. FDA by Michael J. Ermarth

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