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Formula for scientific innovation: Omit walls Design of Stanford's Clark Center fosters interdisciplinary research

Carl T. Hall, Chronicle Science Writer Monday, October 20, 2003

It's all about breaking down barriers at Stanford University as the sleek James H. Clark Center for Biomedical Engineering and Sciences, home of the innovation-minded Bio-X project for interdisciplinary biological research, formally opens this week.

Rooms here are defined by translucent glass. All the furniture is on wheels. Laboratory benches are hooked up to exposed utility systems hanging from the ceiling, easy to get to in case someone wants to push a wall or two out of the way.

Inside the new building, scientists have been setting up shop and struggling to get some work done, bemused by the hullabaloo surrounding one of the most high-profile ventures in academia. Researchers admit to an odd feeling of kinship with their own laboratory rats.

Bio-X is designed to foster collaborations across disciplines and in so doing, speed up innovations in high-tech medicine. It was financed largely by a $90 million grant from James Clark, the founder of Netscape.

"It's an experiment in social engineering," said chemist Tom Wandless, a refugee from what he described as "a very monastic atmosphere" of solitary research, now suddenly thrown in a fishbowl

to work elbow-to-elbow with strange-talking biologists, computer geeks and engineers.

Wandless designs potential new drugs -- small synthetic molecules that can have biological effects -- collaborating with his chemist wife, Karlene Cimprich, another Bio-X convert who is interested in the cellular checkpoints that protect against DNA damage.

Researchers at Bio-X work in one of seven thematic areas, such as biocomputation, the brain and behavior, and regenerative medicine. Projects include design of computer-simulated surgeries, tissue engineering and better ways to display diagnostic scans so doctors can read them quickly and more accurately.

Specialists from many fields might need to collaborate on such tasks, but have been physically and culturally separated until now, said Sandy Napel, co- director of a 3-D medical imaging project.

"We're all into using computers to solve biological problems, and before we were scattered all over the campus,'' he said.

About 270 faculty from all over the Stanford campus have signed on to participate, whether or not they pick up and move to the Clark Center, deliberately located in the midst of such key Stanford facilities as the medical center and departments of chemistry, computer science and systems engineering.

"The effort here is also to create happy collisions,'' said Matthew Scott, a developmental geneticist who serves as chairman of the Bio-X scientific leadership council. "We want to get people talking who wouldn't have even met before, and make this more of a community center, less just another pretty Stanford building.''

Early recruits spoke of the excitement of these chance encounters, students overhearing discussions in one lab about a problem already solved in another, scientists in one discipline realizing they had much in common with colleagues across campus.

Some of the biologists and chemists also spoke of some early frustrations.

It's not always easy, for instance, to get on the same page with someone who plies the frontiers, say, of computer science and physics, their heads full of complex algorithms now being scribbled all over the ubiquitous Clark Center whiteboards.

"If you aren't careful," Wandless said, "you spend 10 minutes talking to these guys and you realize you don't have a clue what they're saying."

So everyone, no matter what their background, has had to learn one fundamental lesson right off: Communication, when it really matters, tends to be difficult.

And like any good experiment, nobody knows how this one will turn out.

Campus leaders are hoping the Clark Center's open, curved design, modular systems and portable furnishings, along with the close ties some of the occupants bring to biotech companies and medical clinicians, will nurture fundamental changes in how academic science gets done.

Rather than forcing doctors to hunt down engineers capable of designing some new device a surgeon might need, Bio-X will offer engineers basic training in medicine. Some of the engineers are being recruited to serve as full-time fellows in the medical center, to gain firsthand exposure to problems that need attention.

This "throws into question every aspect of how we do business at Stanford, '' said Beth Kane, director of Bio-X operations, noting the experiment involves some 26 different academic departments.

"My job -- it's crazy,'' she said. "Each school has a different way of doing things, a different culture, and we're bringing them all into one building. How do you buy supplies? How do you pay people? All this is challenged, and it's all a matter of working things out. I'd say there's been a fair amount of productive tension."

She was deliberately vague when asked to predict what might come out of the Clark Center once the opening speeches and tours are over and forgotten.

"Something completely unexpected is going to happen," she said. "That's the extent of the prediction. If, in fact, I were able to say today this and this are going to happen, then the experiment will have failed.''

Although Stanford's facilities may be unique, the idea behind the Bio-X venture is anything but.

The University of California also has been trying to merge disciplines, going in one sense a step beyond Stanford with a multi-campus project that ties in researchers from UCSF, UC Berkeley and UC Santa Cruz. Like Bio-X, the UC venture also goes by a catchy nickname: "QB3," shorthand for bioengineering, biotechnology and quantitative biomedical research.

The more centers trying to do the same thing, the better, according to Marvin Cassman, executive director of QB3.

"We're hoping and planning to collaborate with people involved in Bio-X as individuals, and hopefully there can be some collaborations between the institutions too," Cassman added.

Some old-fashioned academic concerns, such as grading students and enforcing standards, continue to pose a challenge in the new environment.

Craig Milroy, a senior lecturer at Stanford's design division of mechanical engineering, manages what's known as the "Product Realization Lab" for hatching inventions. He led a class in the Clark Center last week on biodesign, in which students took turns describing ways to improve on the standard stethoscope.

There were some simple, but rather clever, innovations, including a stethoscope designed into a teddy bear for use in pediatric offices, a stethoscope with soft moldable earpieces, a stethoscope with a retractable cord for easier carrying, a stethoscope for use in the outdoors. Some of them seemed problems in search of solutions, and a few seemed to have been cooked up rather quickly.

"Some of you succeeded, some of you failed miserably," Milroy told the class, reminding students that "this is a graduate level class at Stanford University," which meant that no slouching would be tolerated.

Grading sessions, he added, would be conducted in private. Even at Bio-X, multidisciplinary mingling only goes so far.

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