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## Shrinking state support means adjustments at UM

By Janese Silvey

Monday, September 17, 2012

**The University of Missouri System will have to "reinvent ourselves" to buck a trend of dwindling state dollars and increasing costs, the chairman of the UM Board of Curators said.**

Although the system ended fiscal year 2012 this summer with a balanced budget, "expenses went up faster than revenues," Curator David Bradley said. "We can't do that."

On June 30, the end of fiscal year 2012, system revenue exceeded expenses by \$73 million, said Nikki Krawitz, vice president of finance and administration. But she said expenses rose faster than revenue because state support decreased and salaries and benefit costs increased. Adding to the fiscal crunch is the fact that state law limits how much the university can increase tuition.

That's an unsustainable trend that will require changes, Bradley said after last week's two-day board meeting in Columbia. This morning, he said he's not sure specifically how to solve the problem.

"It's going to take a lot of study and work and review," he said.

And Bradley also believes it will require some radical adjustments.

"We've got to reinvent ourselves because we're not going to get money from the state," he said. "Every year, it's going to continue to go down. We have to reinvent how we raise revenues through new efforts on research that produce royalties and patents, new partnerships with businesses."

A first step, Bradley said, would be for the university to start focusing on output — such as making sure students have jobs after they graduate — rather than traditional metrics used to gauge higher education, such as how much money is spent per student.

That's a model Michael Crow, president of Arizona State University, pitched to the Board of Curators on Friday. He has spent the past decade at ASU dramatically changing operations to boost enrollment and success despite cuts in state support. Under his leadership, he said, 69 academic units have been revamped in a way that better aligns academia with the real world.

Although Bradley said some of the ideas might not work for UM campuses, "there are a lot of things that need to be redone, just like businesses have reinvented themselves," he said.

"We have to have a new way of doing things to become more efficient and effective."

Bradley said that might mean taking a look at the number of administrators in the system and on the four campuses.

"That's the kind of thing we have to look at: the number of administrators and support staff versus teaching staff," he said. "If there are as many administrators and support staff as people who are actually teaching, that's too many. I'd rather put more money into people teaching students rather than the administrators supporting the teaching staff. ... Efficiency in University Hall, we want" UM President Tim Wolfe "to look at that as well. That's not going to be exempt from any of this reinvention going on."

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# ST. LOUIS POST-DISPATCH

## Missing curators could delay partner benefits vote

**A push to offer domestic partner benefits to workers at the University of Missouri's Columbia campus appears to be on hold because of two vacancies on the nine-member Board of Curators.**

The Columbia Daily Tribune ( <http://bit.ly/UfRib9>) reported Monday that a former Faculty Council chairwoman wants the conservative-leaning board to hold off on the proposal until Gov. Jay Nixon, a Democrat, fills two slots on the governing board.

The vacancies occurred when two Democrats left the board before their terms expire on Jan. 1. The curators have one more scheduled meeting this year, Dec. 6-7 in St. Louis, making it unlikely new members will be appointed.

Four Republicans and three Democrats now serve on the board, which by law can have no more than five members of the same political party. Nixon faces a November general election against Republican business owner Dave Spence.

New UM System President Tim Wolfe said in February he wanted the board to decide the issue this year. Wolfe reiterated that stance Friday at a curators' meeting in Columbia.

The state's newly redrawn congressional districts also are a factor in the curator vacancies.

One of the board's vacancies is for a seat representing the 9th Congressional District to succeed Bo Fraser of Columbia, who left in 2010. But after January, that district will no longer exist, with Columbia part of a newly drawn 4th District.

Pam Henrickson of Jefferson City, the current 4th District curator, will be part of 3rd Congressional District in January. The governor's office did not respond to several phone calls and emails seeking comment, the Tribune reported.

Leona Rubin, the former faculty group leader and longtime backer of expanding employee benefits to same-sex couples, said "there's a very good chance" the current board would not approve of the change.

"I think it would be better to have a full body vote on this than push it through," said Rubin, an associate professor of veterinary biomedicine. "One or two months is not going to make a difference in the big picture."

Supporters of such expanded benefits include Columbia campus chancellor Brady Deaton and Missouri athletic director Mike Alden. They note that more than 300 colleges and universities already have such perks in place for faculty and staff. So do many of the nation's Fortune 500 companies.

In April, the Missouri University of Science and Technology became the UM System's final campus to approve a resolution supporting domestic partner benefits. Rubin and others have said the university system risks losing the chance to hire talented professors without the expanded benefits.

"This is not about giving up marriage. This is about equality for the employees they hire," she said. "It would be embarrassing if it failed."

Board chairman David Bradley, a Republican from St. Joseph, said the board has not discussed domestic partner benefits, nor has he talked to Wolfe about it.

"I think we need a little more discussion before we have to vote on this thing," said Bradley, who in the past has cited concerns about financial implications. The UM System has estimated that expanding benefits to same-sex couples would add about \$1 million to benefit costs.



## Vacant curator seats could affect partner benefits issue

By Janese Silvey

Monday, September 17, 2012

**A longtime proponent of expanding employee benefits to same-sex couples at the University of Missouri is hoping the UM Board of Curators holds off on voting on the issue.**

That's because the board is short two curators — appointments that might not be filled until next year — and now leans conservative.

"I think it would be better to have a full body vote on this than push it through," said Leona Rubin, an associate professor of veterinary biomedicine. "One or two months is not going to make a difference in the big picture."

Rubin is a former chairwoman of the MU Faculty Council who spent years making a case that the university needs to adopt domestic partner benefits to recruit top-notch faculty. In April, the Missouri University of Science and Technology became the UM System's final campus to approve a resolution supporting domestic partner benefits.

In February, UM System President Tim Wolfe said he wanted the board to decide on the issue this year. On Friday, he said he still is committed to having that discussion by the end of this year.

The curators' next meeting, set for Dec. 6 and 7 in St. Louis, is the last one this year. It is not clear whether Gov. Jay Nixon will appoint two new curators by then, but insiders say it is unlikely. Nixon's office has not returned multiple phone calls and emails from the Tribune seeking comment.

The two open seats — both vacated early by Democrats — are for terms that end Jan 1. That means anyone appointed this year would serve at just one meeting before his or her term ended.

Waiting until next year also allows Nixon to appoint members based on the new congressional boundaries. Right now, the Ninth District curator slot is open, having been vacated by Bo Fraser of Columbia in 2010, but after January, that district will no longer exist. Columbia will be

enveloped into a newly drawn Fourth District. Pam Henrickson of Jefferson City is now the Fourth District curator but will move into the Third District in January.

Warren Erdman, a Republican from Kansas City, also will see his term expire Jan. 1 but by law can continue to serve until Nixon appoints a replacement.

The board, by law, cannot have more than five members from the same party. It is now made up of four Republicans and three Democrats.

If a vote were to be taken now, Rubin said, there's a "very good chance" domestic partner benefits wouldn't pass.

Board Chairman David Bradley, a Republican from St. Joseph, said the board has not discussed domestic partner benefits, nor has he talked to Wolfe about it.

"I think we need a little more discussion before we have to vote on this thing," he said.

Bradley in the past has cited concerns about financial implications. The UM System has estimated that expanding benefits to same-sex couples would add about \$1 million to benefit costs.

But it would be more costly for the university to continue to not offer benefits to those couples, said Rubin, who pointed out that most other Association of American Universities institutions offer domestic partner benefits. Locally, Stephens, William Woods and Westminster campuses provide benefits to employees with same-sex partners.

Rubin said she understands individuals have personal opinions about differing lifestyles, "but this is not about giving up marriage. This is about equality for the employees they hire," she said. "It would be embarrassing if it failed."

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# THE WALL STREET JOURNAL.

## Printing Evolves: An Inkjet for Living Tissue

In about a dozen major university and corporate laboratories, biomedical engineers are working on ways to print living human tissue, in the hope of one day producing personalized body parts and implants on demand. Still far from clinical use, these tissue-engineering experiments represent the next step in a process known as computerized adaptive manufacturing, in which industrial designers turn out custom prototypes and finished parts using inexpensive 3-D computer printers.

Instead of extruding plastic, metal or ceramics, these medical printers squirt an ink of living cells. Researchers call it by the shorthand bioprinting.

The machines can build up tissue structures, layer by layer, into all sorts of 3-D shapes, such as tubes suitable for blood vessels, contoured cartilage for joints, or patches of skin and muscle for living Band-Aids, recent laboratory studies have demonstrated.

"You can print a tissue dot by dot," says bioengineer Gordana Vunjak-Novakovic at Columbia University's Laboratory for Stem Cell and Tissue Engineering. "Bioprinting is a very clever technology which actually brought a completely new use to something very old that we all have at home, which is the inkjet printer."

At Cornell University in Ithaca, N.Y., researchers are printing experimental heart valves, knee cartilage and bone implants. At Wake Forest University in North Carolina, bioengineers are printing kidney cells. Their colleagues are working on a portable unit to print healing tissue directly into burns or wounds. **At the University of Missouri-Columbia, researchers have printed viable blood vessels and sheets of beating heart muscle.**

Eventually, biomedical engineers hope to print out tailored tissues suitable for surgery and entire organs that could be used in transplants, to eliminate long delays for patients awaiting suitable donor organs and the risk their bodies may reject the tissue.

"Clearly, this is technology with many applications," says biophysicist Gabor Forgacs at Missouri-Columbia, who helped to pioneer bioprinting.

The technology faces many hurdles. It may be five years or more before even the simplest of these experimental prototypes is ready for clinical testing. Problems range from the challenge of keeping large tissue structures alive to the lack of computerized tools for personalized organ design.

"A lot of biotech companies are sniffing around to see what the

market value of all this bioprinting might be," says robotics engineer Hod Lipson, head of Cornell's Creative Machines Lab and co-author of "Fabricated: The New World of 3D Printing."

**Leading the way is a closely held, San Diego-based company called Organovo Inc., which introduced the first commercial 3-D bioprinters in 2010, using technology developed by Dr. Forgacs at Missouri-Columbia and by researchers at Clemson University.**

So far, the company has made 10 of its "NovoGen" bioprinters, at a cost of several hundred thousand dollars each. The company won't disclose precise cost information.

"It allows us to print a tissue structure that is a functional, living, human tissue," says Organovo Chief Executive Keith Murphy.

Organovo doesn't sell them yet, but keeps the equipment for its own product-development projects. It does share them with other researchers through partnerships with Pfizer Inc., United Therapeutics Corp., and Harvard Medical School, among others. Mr. Murphy declined to disclose the details of these arrangements or say what bioprinted cell products were in development.

The programmable printer has laser-guided printing nozzles that can extrude inks composed of different cell mixtures. In each drop of ink is a solution that contains about 10,000 to 30,000 cells. The bio-ink is a mix usually cultured from stem cells taken from a donor's bone marrow or fat. Those cells can then be grown into the many different cell types necessary for tissues.

"You use building blocks of cells to make a 3-D structure, almost like building something out of Legos," Mr. Murphy says. "The cells do all the finishing touches themselves."

To contain the cell structure in the desired form, the printer lays down layers of water-soluble gel at the same time. "It is like printing a mold at the same time that you print the cells," says Sharon Presnell, Organovo's chief technology officer. "That helps it get the shape."

Once printing is complete, the tissue usually can support itself after about 24 hours. Then the gel mold can be removed. The tissue is kept alive in a bioreactor bathed in nutrients. Generally, it takes another three weeks before the tissue gains its full strength, as the cells build bonds between themselves.

Printed in a tube, such as a blood vessel, the finished tissue can withstand about six times the force of normal human blood pressure—still only half the strength of a natural blood vessel.

Every organ type and tissue structure has its own complicated internal architecture. At Organovo, researchers believe that there are basic cell patterns that, once fully understood, can be readily duplicated by bioprinting.

"Most tissues are repeating units," she says. "The liver is a series of globules. The kidney is a set of pyramids. The body is a set of tubes."

So far, bioprinting works best to make relatively simple cell structures a few hundred microns thick—the thickness of a few human hairs—comprising about 20 layers or so of cells. Among other things, larger printed tissues such as cartilage often aren't strong enough on their own to withstand normal wear and tear.

More important, biomedical engineers say they haven't yet mastered ways to print the microscopic networks of capillaries that run between layers of cells to keep normal tissue alive.

"One of the big challenges is figuring out how to feed these tissues," says Christopher Chen, director of the University of Pennsylvania's Tissue Microfabrication Laboratory in Philadelphia.

But even these rudimentary three-dimensional lattices of human cells could be valuable for drug discovery efforts and preclinical safety testing, researchers say.

Grouped together in a 3-D structure, human cells behave more normally than when they are cultured in a single isolated layer, as is customary in most laboratory tests, researchers say. That means clusters of bioprinted cells may be more realistic for pharmaceutical assays, compared with traditional lab cultures and animal tests, which can often produce medically misleading results.

"We will see more and more of bioprinting for the purpose of testing and developing drugs," says Mr. Lipson at Cornell.

In the near term, Organovo has concentrated on developing 3-D cell cultures suitable for drug-discovery assays and toxicity tests, a global market currently valued at about \$11 billion a year, according to BCC Research. In March, the National Institutes of Health gave the company a \$290,000 grant to study ways to print 3-D liver cells—an important cell type for toxicology tests.

Advances are needed in the computer programs that will allow clinicians to routinely turn patients' CT scans and X-rays into digital diagrams for printed body parts, researchers say. "We have machines that can make almost anything, but we don't have the design tools," says Mr. Lipson. "In bioprinting, there is no computer-aided design software for body parts."

In the long run, bioprinting is bound to generate ethical concerns, as tissue engineers move from replacing and renewing body parts to improving them, Mr. Lipson says.

"The issue of enhancement has always been around, but this makes it more urgent," he says. "If you are an athlete with improved knee cartilage, would you be disqualified because you were bouncier?"