

PRINT-(Part two) OSF HealthCare and Caterpillar: Removing health care obstacles through collaboration

Advanced imaging and modeling offers life-saving option for complex surgeries

A company known for its Earth moving equipment is also moving mountains when it comes to helping people facing complex surgeries.

Caterpillar Industrial Designer Christian Ritchie says the collaboration to help OSF HealthCare has given him joy – knowing he's helping people facing difficult odds of surviving their diagnosis. Such was the case of Kevin Asbury – a cancer patient at OSF HealthCare Saint Francis Medical Center in Peoria.

“So, when OSF was reaching out to get help printing a liver for a patient, they didn't have quite the right machine to do that, but we had that machine here, so it was a collaboration with the additive manufacturing factory people.”

“I was expecting something metal when it came from Caterpillar,” Asbury said laughing.

The 3D model was created to give Dr. Sonia Orcutt a better view of the cancerous tumors she needed to remove from Asbury's liver. It allowed for a translucent print of the organ with colored tumors and is the result of close, ongoing collaboration between OSF and Caterpillar through the automated segmentation process at the OSF Innovation Advanced Imaging & Modeling (AIM) lab.

Dr. Orcutt felt more confident in her surgery plan once she was able to see the model.

“Because his particular tumors were close to the big vessels in the liver, what I was trying to understand better with the model is rather than taking this whole big blood vessel and therefore removing most of the liver, actually it was about 70%... can I save a large portion of his liver?”

And she did. The surgery Dr. Orcutt performed in the spring of 2021 greatly improved Asbury's prognosis.

It was a thrill for the Caterpillar team which helped to print the model when they were able to meet Kevin and his wife, Melissa in person, including Eric Bonk from the Cat Industrial Design division.

“We've done hearts for patients in the past. But with the HIPPA laws and stuff, you can never know who you're doing the work for, right? So, you never find out if the person did okay, or how it all turned out. So, to actually meet someone and see that they're doing well was fantastic. Loved it.”

While 3D printing is not yet the standard of care but leadership at OSF Innovation is hopeful it's only a few years away because they see so much potential for it in the future.

“Every day, complex surgeries are happening across the United States and across the world. How can we get this technology, so that people can pre-plan, they can see the anatomy, they can see the complexity, they can make better decisions pre-op. How do we get that out there and to scale? That's our next great challenge!”

Sister M. Pieta (pronounced pee-AY-tuh), a biomedical engineer for OSF Innovation at the [Jump Simulation and Education Center](#) worked on Asbury's case, segmenting his liver from images for the Cat 3-D printing process.

She believes having an advanced model made a significant difference in the success of Asbury's surgery and will in others. To date, nearly 50% of oncology cases evaluated in virtual reality resulted in changes to the surgical plan.

"Because they can now physically hold the part of the tumor or the vessels that are interacting with the tumor or the heart itself, and they can see those different defects or what is there and shouldn't be, if there's a tumor in the patient ... different things like that."

With the help of a grant through [Jump ARCHES \(Applied Research for Community Health through Engineering and Simulation\)](#), researchers from the University of Illinois automated segmentation for cardiac and neurology MRIs so it now takes minutes rather than hours to convert images manually for VR and 3D printing.

Dr. John Vozenilek, vice president/chief medical officer of OSF Innovation and Digital Health, says that's where philanthropy – from Caterpillar, OSF, and donors - is so important in advancing innovation.

"We'd probably get there but we'd be slower; take fewer risks. Philanthropy plays a key role for us."

Most importantly, this innovation is improving surgical outcomes for individuals who don't pay anything for the advanced technology.

[Learn more](#) about OSF Innovation's Advanced Image Model program.