London was thrust onto the world stage in 2018 after local pioneering company ADEISS—Additive Design in Surgical Solutions—helped reconstruct the skull of an American dog named Patches, allowing scientists at Cornell University to operate on a malignant tumor in the dog’s head.

That technology could soon assist humans as well. The company was supported by Western University’s Bone and Joint Institute. Dr. David Holdsworth is the scientific director of both ADEISS and the institute.

“Right from the beginning of the Bone and Joint Institute we put a focus on innovation,” Holdsworth said. “For the institute, it’s about finding solutions that will improve people’s quality of life and increase our national and international profile.”

ADEISS is what the founders of the Bone and Joint Institute envisioned when they laid a training foundation a decade ago, to open up pathways for collaborations that could one day lead to better, more impactful research, the development of high-quality personnel, and commercial opportunities.

An imaging scientist by trade, Holdsworth took full advantage of those collaborations when setting up the metal-crafting company, relying on input from engineers, surgeons, and other medical professionals. Their expertise helped direct ADEISS, creating a local 3D metal-printing service that could soon permanently change the way surgeries are handled. “That’s where application comes in,” Holdsworth said. “You have to be able to invent, but you also have to execute.”

Inspiring solutions, the Bone and Joint Institute facilitates accelerated development of innovations

Outside the box: Pushing Innovation
Most don’t get that far. Holdsworth’s startup might be a success story now, but setting up the high-tech company should have been prohibitively risky. What if they used the wrong materials? What if they focused on the wrong problems? One early misstep could have cost the company months or years — time it didn’t have.

To understand why a high-risk, high-reward venture like ADEISS worked, it’s easiest to look at other collaborative institute-supported projects taking place at Western University.

“There have been a lot of advantages to being with the Bone and Joint Institute,” Dr. Ana Luisa Trejos, a mechanical engineer who specializes in wearable mechatronic devices, said. “I know the engineering side very well, but I don’t know the clinical side. Through the institute I can talk to scientists and clinicians that do.”

The partnerships are illuminating, she said. Trejos designs wearable devices that can treat chronic pain or help patients in their rehabilitation process.

Conversely, Trejos’s research opens the door to people like Dr. Tom Appleton, a rheumatologist who treats chronic inflammatory and autoimmune diseases, and Dr. Joy MacDermid, a physical therapist who studies rehabilitation.

“I’ve been able to see a lot more, what is the overall direction of the university and I’ve been able to adapt my research to where everyone else is headed,” Trejos said.

Dr. Elizabeth Gillies is in a similar boat. A biomaterials chemist at Western University, Gillies designs materials that can either release a drug slowly over time, or can lie dormant until triggered by an environmental change.

Those materials have a wide range of applications — especially in medicine. “We’re interested in encapsulating a drug, and then using our polymer to inject it into the joint and release it in a controlled way,” Gillies said.

Gillies met Dr. Frank Beier, a Bone and Joint Institute skeletal biologist. They now co-supervise a student who is investigating that very stream of research.

Holdsworth knew the problem he was trying to solve with ADEISS, thanks to his collaborations with Bone and Joint partners. He knew the technology had the potential for commercial success.

Still, as the 3D metal-printing company started up, Holdsworth wanted one more security blanket. He found one in biomedical engineer and former dental research trainee Dr. Yara Hosein, an early graduate of the Bone and Joint Institute’s collaborative training program.

Hosein now works as the applications specialist at ADEISS.

ADEISS has quickly become a statement for the Bone and Joint Institute. But to hear it from the people involved in the process, it all made sense: there was a known problem, a needed solution, and the expertise to guide the company to market.

“In the past we have directed a lot of our work into the delivery of anticancer drugs,” Gillies said. “So we make materials for cancer but we can also make materials for bone and joint diseases. The chemistry is still the core piece, right? And we can direct our expertise toward bones and joints.”