The Long Game

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By many measures, the United States military is the world's largest educational institution. They train service members in everything from basic language skills to the management and leadership of very complex organizations. Because of their educational mission, they also have been at the forefront of developing new tools and techniques and support many modalities of education, including simulation. One could easily argue that this simulation focus has given us flight simulators, the gaming industry, and head-mounted displays, amongst other innovations. For many years, they have been the only government agency to invest in research and development in healthcare simulation, including several projects undertaken by the UW Center for Research in Education and Simulation Technologies (CREST).

One of these projects, the Advanced Joint Airway Management Simulator (AJAMS), is now in its final phases of assembly and testing before going into a training effect study and a prolonged field test. AJAMS is a manikin-based physical trainer supported by a physiology engine that drives vital signs and allows physicians and medics to practice the management of patients with compromised airways. It is also the first such manikin to have both a female and male instance developed from the very beginning. The manikin goes well beyond technical skills training; it allows for complex scenarios to be implemented that require the provider to first identify what is wrong, then practice increasingly invasive techniques until the airway is secured. AJAMS is the perfect example that highlights the capabilities of CREST, and it has been a truly transdisciplinary team effort (creating a unity of intellectual frameworks beyond the disciplinary perspectives), driving forward the science of healthcare simulation.

In addition to its role in military education, our trainer will also go into service with our very own King County Medic One organization, the very same people we all depend on in case of a healthcare emergency. The acquisition of these systems by the Medic One program has been made possible by direct funding from the Washington State Legislature.

The CREST team has been following a long-term research agenda that ensures every new project we take builds upon our previous efforts, gradually building up a platform that allows us to tackle ever more complex projects. This would not be possible if we did not follow a well thought out roadmap. We not only pursue funding opportunities and collaborations that move the needle in the right direction, but we also seek out the best new team members that add to our overall capabilities.

The AJAMS project brought together all capabilities of our team, starting with human tissue characterization, moving into 3D anatomic modelling from real patient scans, followed by educational design, sculpting, molding, 3D printing, software development, closed loop electromechanical system design and educational research. Core team members have now been working together for over ten years and continue to follow the passion that brought us together from the very beginning.

So, what is next? As part of the Division for Healthcare Simulation Science, with our sister organization The WWAMI Institute for Simulation in Healthcare (WISH), we are hard at work launching a Master's program in Healthcare Simulation Science to train the next generation of researchers, engineers, developers in our field.

Research Staff Highlights

Jason Speich

Research Scientist, Simulated Anatomy Team
Healthcare Simulation Science - CREST Lab

How did you get into this line of research?

My background is in fine art. I studied ceramics and sculpture at a small school in Wisconsin. I had amazing mentors, and I became passionate about my studio classes. It absorbed my time and thoughts and I loved learning about manipulating materials and processes. This included clay, cast metal, woodworking, and electronics. Sculpture was a catch-all for diving into multiple skills. I then taught and ran a sculpture studio at an art school in Colorado. When I moved back to the Midwest I saw a posting for a temporary position at the CREST lab, a medical simulation group led by Dr. Rob Sweet, which at that time was in Minneapolis. Eventually, the position became permanent, and the group grew. It was an unexpected pairing for me, but my background helped me create our physical simulators and I learned about the medical procedures we were representing through collaboration. Our projects ranged from table-top endoscope models with fine details to train scope navigation, a simulated C-Arm to help users safely learn needle guidance, to large, immersive trauma scenarios to train military medics. We build these simulators but also research what is important to simulate accurately during that training.

The CREST lab then moved to UW and I was lucky enough to be invited by Dr. Sweet to come to Seattle to continue the work for the past six years.

What does your typical workday look like/ what do you do?

My days are always dynamic. We often meet with clinicians to better understand a procedure and distill the necessary parts to recreate through simulation. This may be a tissue characteristic or a difficult step. We want to allow a user to correctly perform a procedure, but also allow for common errors that they can learn from. We create a setting where mistakes can happen without consequences. Quality training on simulators translates to improved patient care. I commonly use some very traditional techniques of molding and casting parts that represent patient anatomy. We are also finding innovative ways to combine these processes with new technology and materials. 3D-printing is a new interest of mine. Because the members in our lab have very different backgrounds, we teach each other about the possibilities of our specialties. My days include a mix of observing clinicians, researching procedures, design discussions, testing materials, and prototyping approaches.

What has been your most significant accomplishment/finding?

I find my work very fulfilling as it often has the creative and productive energy of a personal art practice. I am still creating a physical object that requires attention to detail and is setting up an interaction between a user/viewer, but what we are creating is serving a need through improving medical training. I know that I am doing my job well when I see students fully engaged in a procedure on a simulator or a clinician says that they felt their heart rate increase when they were stopping the bleeding in a trainer that we have built. It's an ongoing discussion and a large thrust of our research to better understand what amount of detail is needed to accurately represent a patient or procedure.

Advice for others looking to get into this field?

I wish I would have known about possible jobs like this earlier. I always had an interest in fabrication, engineering, and medicine, but never had formal training in any of these. I now have a job that gets me in the orbit of all these specialties, and it is my background that helped me get here. It was an unlikely path, but I have a unique position in a growing field. I try to encourage people with an art background to not be limited in their scope for finding jobs. Every forward-thinking group is looking for creative problem-solvers. The skills you have learned in your art practice can find a home in exciting and unlikely places.