

## ACS 2022 Surgeons and Engineers: A Dialogue on Surgical Simulation Meeting

### Research In-Progress

#### Going Public in 3D Printing

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**Introduction:** 3D printed surgical simulators are key technologies in medical education. Unfortunately, many training programs cannot access them without equipment, expertise, and funds. Can a new public collaboration meet the need? We are testing the feasibility of engaging volunteer hobbyists in the 3D printing community to mass produce and globally distribute inexpensive, multi-color, multi-material surgical models with acceptable fidelity and validity.

**Methods:** We initiated a donation-based pipeline of temporal bone models to meet the educational needs of otolaryngology training programs. Open source temporal bone renderings were converted to ready-to-print files. The files were optimized for reproducible manufacturing using free software and consumer-grade fused deposition modeling equipment. Volunteers are invited to print the files on their own machines using their own materials, and then donate them to our project. We will post-process, combine, and ship the models in bulk internationally to hospitals and medical schools, sometimes in comprehensive “dissection kits.”

**Preliminary Results:** In phase I (proof-of-concept), 10 volunteers enthusiastically participated in the project, and 5 training programs requested prints for 45 residents and 30 medical students in Thailand, Vietnam, Czech Republic, and the United States. To date, 4 models have been made by 1 volunteer and shipped to residents in Vietnam and Arizona.

**Next Steps:** Our goal in phase II (recruitment pilot) is to serve 25 sites with approximately 15 models each, for a total of 375 models by December 31, 2021. We estimate 3 prints will be donated per volunteer, requiring 125 volunteer hobbyists, plus additional volunteers to support logistics. Work is underway to share the files on common public 3D printing forums and to recruit volunteers.

