Why UMB Needs a Makerspace* with 3D Printing Capability in the HS/HSL

The Health Sciences and Human Services Library (HS/HSL) at University of Maryland, Baltimore (UMB) has recognized the significant impact of the Maker Movement and 3D printing technology on both health sciences research and beyond. The Maker Movement and 3D printing technology catalyze innovation and promote entrepreneurship by emphasizing 'making' over 'consuming' and facilitating experiential learning and rapid prototyping. HS/HSL formed the Makerspace Task Force in order to fully investigate (a) the current use of makerspaces in academic, school, and membership-based makerspaces, (b) the benefits related to education, research, patient care, and entrepreneurship in health sciences that a makerspace can bring to the UMB faculty, students, and researchers, and (c) the possibility of creating a makerspace for the UMB community. The findings and recommendations are contained in the white paper attached here.

The Maker Movement and 3D printing technology are heavily influencing education. An increasing number of K-12 schools are already offering maker camps and opening up makerspaces for students. UMB will see more and more new students arriving at the campus, who are already familiar with and expect to use a makerspace. Johns Hopkins University, Towson University, Maryland Institute College of Art, and Community College of Baltimore County have already created makerspaces in order to proactively meet such expectations from their students. In order for UMB to stay competitive with these other academic institutions in Maryland, we need to take action.

A makerspace at the HS/HSL can help the UMB students, researchers, and faculty achieve many things. Faculty can create instructional tools such as 3D models of molecules or those of human anatomy in order to improve classroom instruction and expedite a student's learning process. Researchers can strengthen their grant proposals for funding by including the HS/HSL makerspace facility, equipment, service, and staff-expertise. They can also quickly prototype a physical model of a medical or healthcare-related invention to test out the feasibility of a further entrepreneurial pursuit, commercialization, and mass production. Students will be able to explore novel technology that has a significant impact on health sciences, benefit from interdisciplinary learning and collaboration opportunities, and prototype physical models for their ideas and concepts for study, research, and experimentation.

Below are some examples of what is currently taking place in the Maker Movement and 3D printing technology.

- A Baltimore-based startup company, Verve, launched a Kickstarter campaign for their 3D printed device for posture and pain relief called ARC and raised over $7,000 in less than 24 hours. The company includes Dr. Gene Shirokobrod, a UMB faculty member in the School of Medicine.

- A surgeon in Sinai Hospital of Baltimore performed a total knee replacement surgery using 3D printing technology to cast an implant and manufacture the jigs — plastic cutting guides — that direct incisions.
- Pharmacists are exploring a way to use 3D printing to produce medicine to make it more affordable and customizable to the needs of individual patients.
- A man in Massachusetts created a prosthetic hand for his son who was born without fingers using a 3D printer at only a fraction of the cost for a commercial prosthetic hand.
- The National Institutes of Health recently launched the 3D Print Exchange, so that researchers can share 3D print files, thereby acknowledging the important role of 3D modeling and printing technology in biomedical and scientific research. Scientists are already bio-printing human tissues and attempting to 3D print a human organ itself.
- The White House held its very first White House Maker Faire, stating that that the rise of the Maker Movement represents a huge opportunity for the nation and that it would create the foundation for new products and processes that would help to revitalize American manufacturing in the same way that the Internet and cloud computing had lowered the barriers to entry for digital startups.

For these reasons, we strongly recommend the creation of a makerspace in the HS/HSL open to all UMB students, researchers, and faculty. The makerspace will be equipped with 3D printers, 3D scanners, and computers with 3D modeling software. It will also offer other tools and multiple learning resources related to hands-on learning and experimentation activities. The HS/HSL Makerspace will also plan and hold a variety of workshops and events to spread the knowledge of 3D modeling/printing technology more widely on the campus. This will promote active collaboration, experimentation, innovation, and entrepreneurial pursuits among students, researchers, and faculty across different disciplines and academic units. The HS/HSL is actively investigating a few potential funding sources to create a makerspace for the UMB community. You can find more details about the HS/HSL's Makerspace project in the attached Makerspace Task Force white paper.

**'Makerspace' refers to a community-operated workspace where people with common interests in computers, machining, technology, science, and art meet, socialize, and collaborate on 'making' activities. The goal of a makerspace is to foster and facilitate people's creativity and innovation. To achieve this goal, makerspaces offer (i) tools and equipment that are not readily available at home such as 3D printers and laser cutters, (ii) organize events and workshops, and (iii) provide a collaborative space where people can learn by hands-on activities and experiment. 3D printing is the most prominently featured technology at makerspaces because of its ability to quickly create a physical model at an affordable cost.*