Rashi Iyer is a Staff Scientist in the Defense Systems and Applications Division at Los Alamos National Laboratory. Dr. Iyer received a Ph.D. in Toxicology from the Univ. of Texas - MD Anderson Cancer Center, Houston, TX. She has spearheaded the Engineered Biosystems Program at LANL and in her capacity as Project Director of the program, has built a team comprised of cell biologists, microbiologists, engineers and material scientists. She is the technical lead on several projects largely focused on the development of advanced platforms for the rapid screening of drugs, medical countermeasures and detection of chemical, biological, and radiological threat agents. She will provide an overview of current efforts towards developing a human multi-organ platform and associated challenges from an engineering and biological perspective. Advances in cell/tissue culture, microfabrication and biocompatible materials enable the construction of devices allowing for the growth of complex biological systems. By the judicious design and synthesis of complex extracellular matrices, topographical features and mechanical properties it is possible to manipulate the phenotype of the tissue such as to obtain the desirable functional responses. These biomimics have the potential to simulate complex organotypic physiology amenable to rapid and high-throughput analysis not possible with animal studies.