

## Making Space Work: Lower Cost Through Innovation

Houston, Texas (“Space City”) is the home of NASA’s Johnson Space Center (JSC) and Mission Control for all U.S. manned space flight communications and control. Today JSC is responsible for managing and operating the International Space Station, selecting and training astronauts, directing extravehicular activities, leading the advanced human support technology program, conducting biomedical research and providing space medicine. The Bay Houston area has developed around JSC to become a major technology center that is home to the leaders in the aeronautics and space industry. Located around JSC are all necessary facilities for the study of human space flight as well as for the training of astronauts.

The biggest problem facing the space industry is cost. To succeed, what commercial orbital transport system vendors will have to do is to solve the problem the Space Shuttle failed to solve: bringing down the cost of lifting materials from Earth to low Earth orbit by an order of magnitude. Two major obstacles stand in the way. Both are as much cultural obstacles as they are technical ones. First, in the government space program, risk reduction has come to mean using high heritage technology at all costs. Innovation has been virtually stopped by this attitude. Second, launch vehicles are designed and prepared as one-off prototypes. Space vehicles and space launch preparation procedures have not been designed to facilitate low cost, high rate operations without sacrificing reliability. The commercial airline industry is living proof that this situation can be changed into a more viable option. The long-range approach of the future space industry should be to develop, implement and promote research, training and communication programs intended to reduce the cost of commercial space transport by changing the culture of the space industry. We at UHCL seek to promote the importance of innovation as fundamental to risk reduction and we will seek to bring the engineering approach and operational attitude of the airline flight line to the space launch facility.

The UH system has had a long relationship with NASA and human space flight. In fact, UHCL was founded in direct response to the educational needs of NASA employees at JSC. UH began offering courses in physics, math, and various engineering programs to NASA employees in 1964. This partnership led the MSC Director, Robert Gilruth, to invite the establishment of a permanent campus in the Clear Lake Area, adjacent to JSC. The university seeks to promote the importance of innovation as fundamental to risk reduction; we will also seek to bring the engineering approach and operational attitude of the airline flight line to the space launch facility. We and our collaborators will help develop a safe commercial space transportation industry by creating a pool of technical professionals trained in areas related to the commercial space transportation industry and fostering cooperative government-university-industry research and development efforts.

David Garrison, Ph.D.  
Associate Professor and Chair of Physics  
University of Houston Clear Lake