

# Overview of the System Integration Lab and Its Role in the Space Launch System

*Matthew Pickard- Computer Science/UAH  
David Rose- Marshall Space Flight Center*

## Introduction

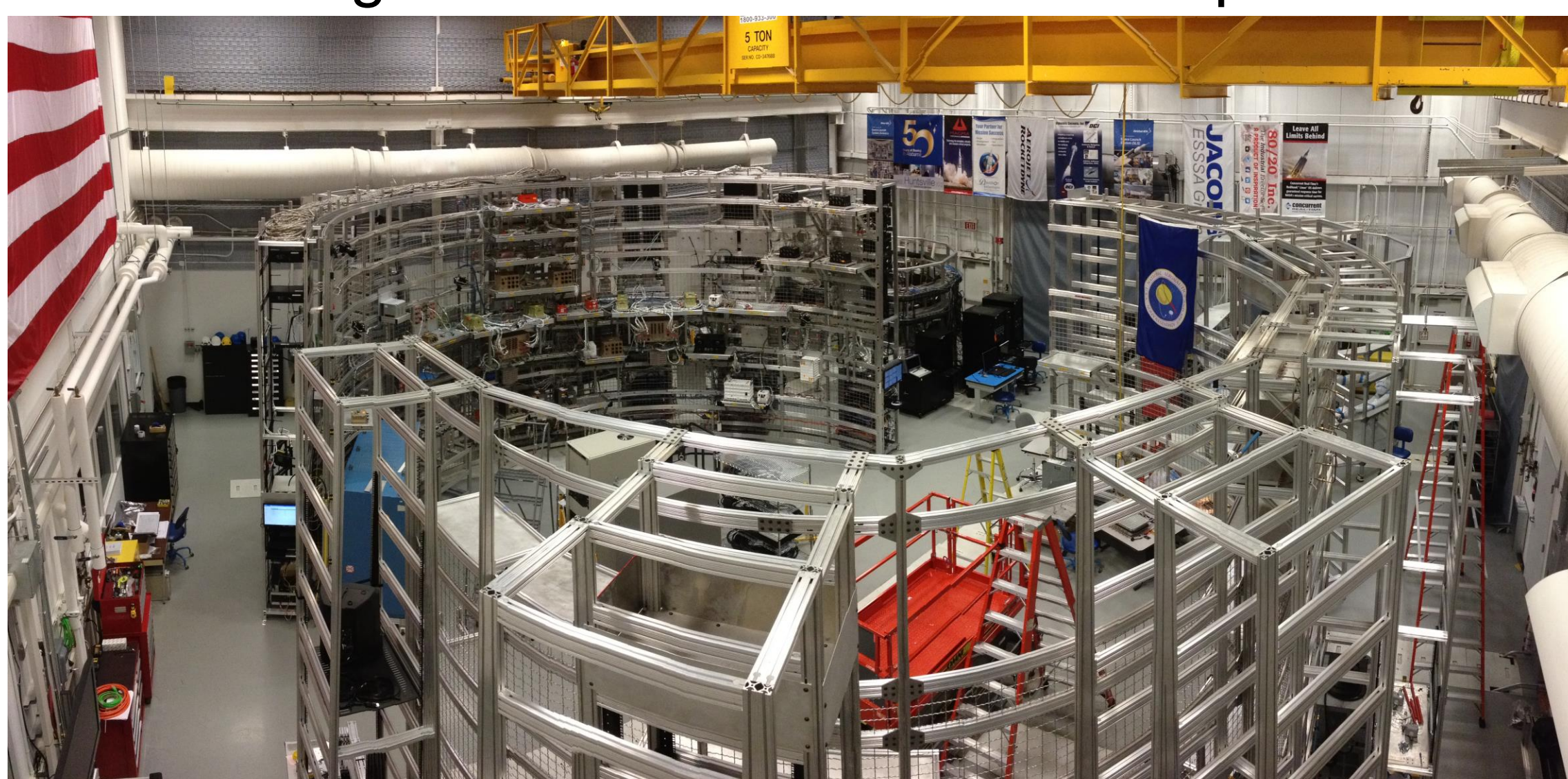


The Space Launch System (SLS) is a US super heavy-lift expendable launch vehicle currently under development. It is the primary launch vehicle of NASA's deep space exploration plans, including the planned crewed lunar flights of the Artemis program and a possible follow-on human mission to Mars.

## Concept

The System Integration Lab (SIL) and the Thrust Vector Control Test Lab provide integrated test environments for the Space Launch System's flight software and avionics hardware. The avionics system is distributed across the entire SLS launch vehicle, including Core Stage, Boosters, and Core Stage Engines.

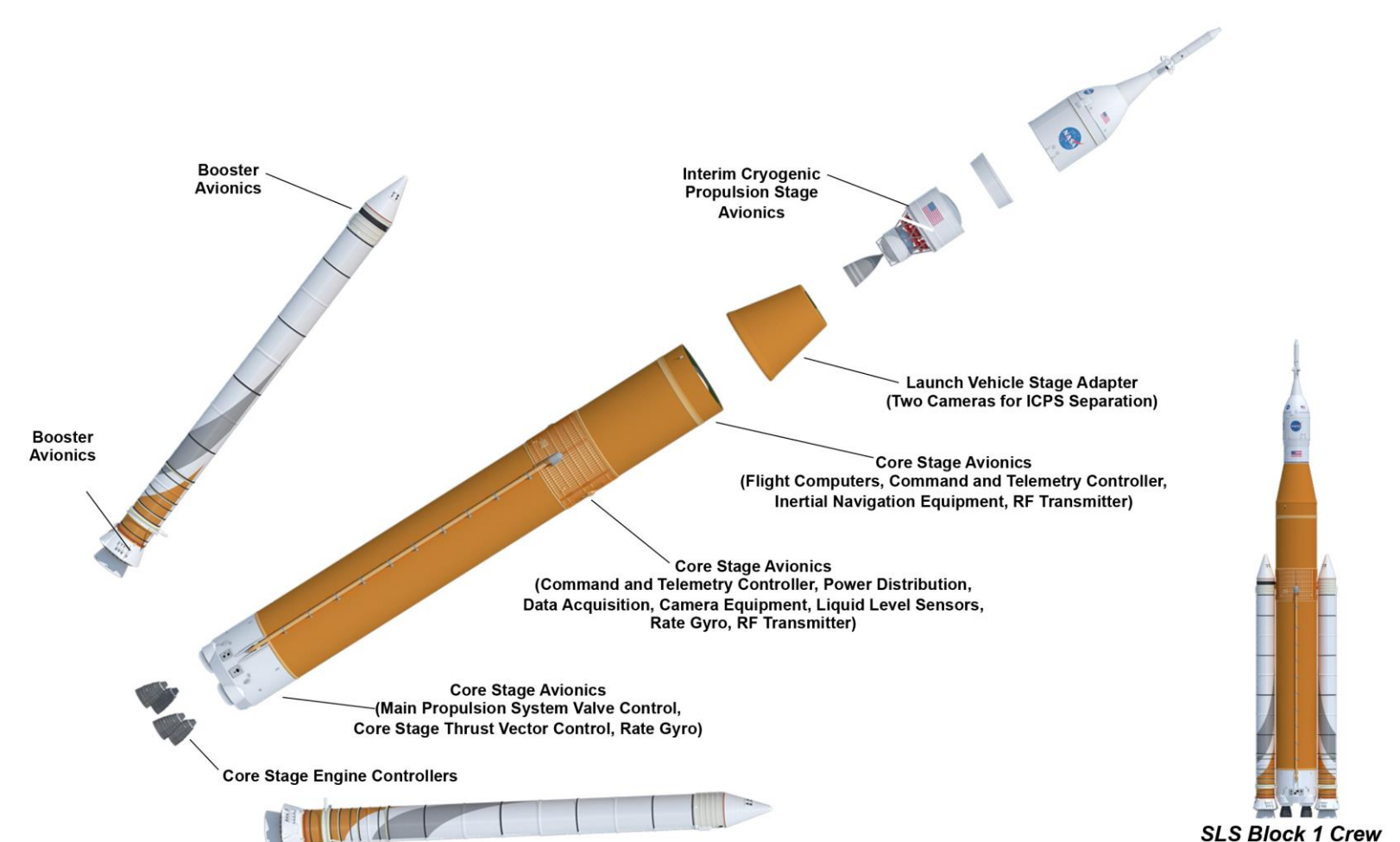
The avionics system, along with the flight software, maintains control over the integrated launch vehicle throughout the entire SLS mission profile.



## Operations/Impact

The SLS SIL supports end-to-end integrated avionics and software integration, verification, and validation. This capability includes an Advanced Real-Time Environment for Modeling, Integration and Simulation (ARTEMIS) — a suite of models, simulations, and hardware interfaces used for simulating SLS avionics hardware and software.

SIL operators have the ability to “fly” the SLS mission thousands of times before the actual first flight in 2019. How the rocket reacts to “what if” scenarios allows engineers to gauge potential systems faults or failures.



Early hardware/software integration and testing reduces risks and saves overall cost and schedule throughout a program/project life cycle.

By performing early hardware/software integration, potential architecture and interface-related problems can be identified, and thus reduce associated risk as early in the design cycle as possible when problems are the least expensive to resolve while also improving the design and requirements.

This simulation approach minimizes mission risk and schedule delays in a cost effective manner.

## Acknowledgements

Thanks to Walter McGregor, Lisa Mitchell and the rest of the integrated avionics testing facility team.

