AFRL
THE AIR FORCE RESEARCH LABORATORY
LEAD | DISCOVER | DEVELOP | DELIVER

Graphic by Ms. Stephanie Mee, Ball Aerospace, 711 HPW/RHB

Overview of Project

- Integrated Cockpit Sensing Program managed by AFRL in partnership with AFLCMC

- Produce a high-quality, easy-to-use system that will gather human biometric and aircraft condition data that explains previously unexplainable physiological episodes
  - In-flight analytics and alerting to pilots

- High TRL - Stand-alone system
  - No aircraft power or data required

- Prototype → Test in ~2 years

- Transition in ~3 years

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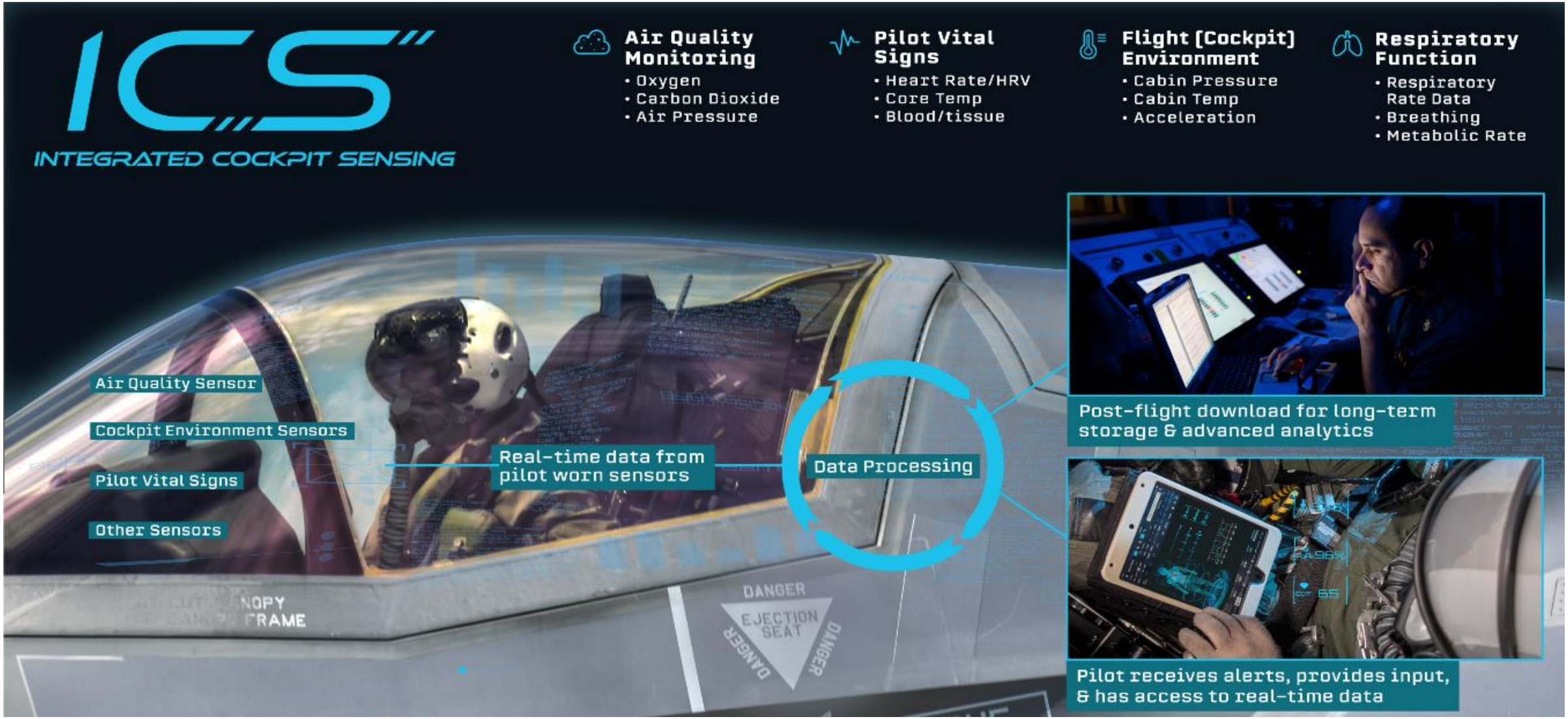
OV-1



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Project Description and Focus Areas

- Aircrew worn and aircraft mounted sensors integrated with a common data storage platform and real-time aircrew alerting capabilities to alert and help prevent physiological events (PEs).
  - 5x Prototypes for testing, evaluation, and field demonstration
  - Technical Data Package
- TRL-7 at end of program
- Air Worthiness certification
- Safety of Flight certification
- Authority to Operate package

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Biodynamic Injury Assessment of the Next-Generation Fixed Wing Helmet

Project Lead: Mr. Benjamin Steinhauer
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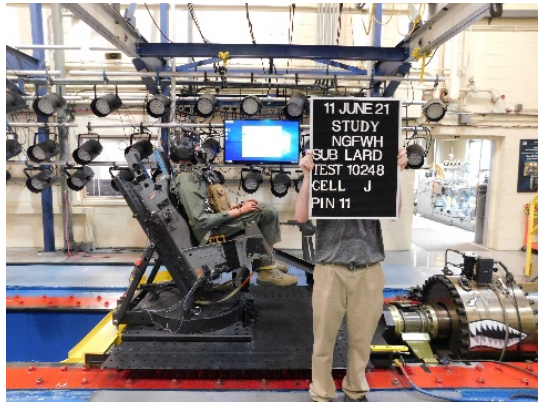
PI Org: 711 HPW/RHB
Transition to: AFLCMC Human Systems Division
Contributing Groups: AFLCMC, Lift, Gentex



Description

We dynamically tested the capability of both helmet deliverables through +Gz and -Gx orientations to simulate the catapult and drogue phases of ejection. Both a LOIS and a LARD anthropometric test device (ATD) model were utilized to address the injury assessment for both ends of the pilot population. These injury requirements are in accordance with 516C specifically looking at MANIC, NMIx, and concussion.

Delivering

Injury risk assessment, pertinent findings, and recommendations based on dynamic testing. Comparison data between both vendors as well as the legacy HGU 55/P that is common among fixed wing aircrafts in both their slick and JHMCS configurations.

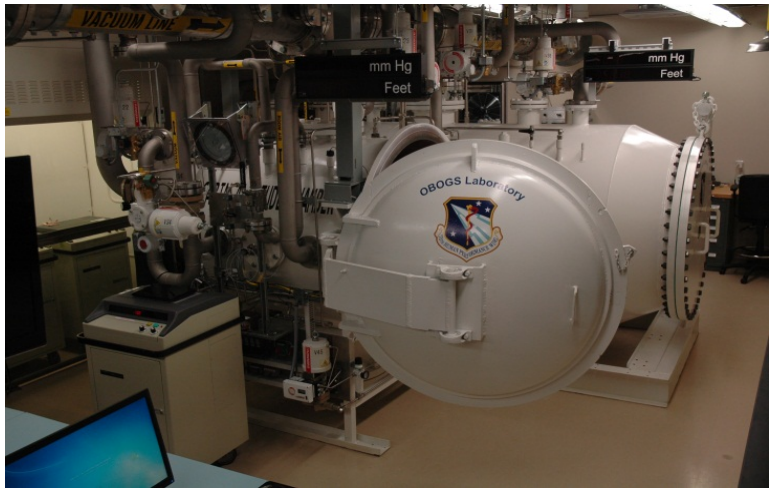
Technological Approach

- Use of both Vertical Deceleration Tower and Horizontal Impact Accelerator to simulate the catapult and drogue phases of ejection specifically targeting T-6/38 and F-16 pulses.
- Utilize LOIS and LARD fully instrumented ATDs to include head, upper and lower neck, chest, and lumbar to comprehend the events and how it compares across each helmet, with and without HMDs, and across the pilot population range.
- Phantom high speed video is utilized to see helmet motion and adverse events through testing to not only help verify potential data anomalies, but the fit of each helmet under dynamic loading conditions.

Benefits to the Warfighter

- Competition between helmet vendors that pushes the design, capabilities, and safety to deliver the best solution to the Air Force.
- Utilization of current helmet technologies to replace a legacy design that incorporates current HMDs and updated specifications and standards.
- Increase force effectiveness by increasing safety, fit, and comfort of pilots.

On-Board Oxygen Generating System (OBOGS) Laboratory



OBOGS Laboratory, 711 HPW/RHBF, Wright-Patterson AFB OH

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PI Org: 711 HPW/RHB
Customers: AFLCMC Aircraft Program Offices

OBOGS Laboratory has supported AFLCMC aircraft program offices, pilot physiological event investigations, and safety investigation boards from 2015 to the present.

Description

We conduct test and evaluation of aircraft OBOGS and life support equipment using realistic in-flight test conditions. Further, we conduct research and development of life support equipment and sensors.

Delivering

- Data and quick-look assessments are delivered to the aircraft program offices
- Equipment performance is assessed using aircraft system specifications and military standard requirements

Technological Approach

- Aircraft flight profile data are used to program lab computers to achieve fully automated flight simulations
- Highly dynamic in-flight operating conditions, such as altitudes, OBOGS operating pressures, and pilot breathing flows are simulated

Benefits to the Warfighter

- Supports aircraft pilot physiological event investigations
- Lab efforts contributed to reduction in pilot physiological events
- Laboratory data support development of new life support equipment
- Laboratory assesses safety and effectiveness of life support eqpt.