THE VALUE OF ENDURANCE

A MAJOR ADVANTAGE OF UNINHABITED (“UNMANNED”) AIRCRAFT IS THEIR INCREASED ENDURANCE COMPARED TO HUMAN-INHABITED (“MANNED”) AIRCRAFT.

Removing the human from the aircraft saves weight and allows novel aircraft designs, both of which can increase aircraft endurance.

Even if the aircraft design is the same, removing the human allows the aircraft to stay aloft with a longer mission endurance, refueling multiple times beyond the limits of a human pilot.

INCREASED ENDURANCE HAS BOTH COST SAVINGS AND OPERATIONAL BENEFITS.

FEWER AIRCRAFT

are needed to sustain the same 24/7 coverage forward over a target area, resulting in valuable savings.

LONGER ENDURANCE

also results in greater operational reach, allowing U.S. aircraft to cover a wider area from the same airbase.

THE VALUE OF AIRCRAFT ENDURANCE: AFFORDABLE PERSISTENT COVERAGE

Uninhabited aircraft can remain aloft far beyond the limits of a human pilot.

80 HOURS

is the current endurance record for an uninhabited aircraft set by the Orion aircraft in December 2014.

100 HOURS

of unfueled endurance is achievable with current aircraft designs.¹

Ultra-long endurance leads to both greater operational reach and cost savings relative to shorter endurance aircraft, a winning proposition at all ranges.

¹ IN ADDITION TO AURORA FLIGHT SCIENCES’ ORION AIRCRAFT, OTHER ULTRA-LONG ENDURANCE UNINHABITED AIRCRAFT IN DEVELOPMENT INCLUDE BOEING’S PHANTOM EYE AND AEROVIRONMENT’S GLOBAL OBSERVER.

THESE ADVANTAGES ARE VITAL TO RESPONDING TO NEAR- AND FAR-TERM OPERATIONAL CHALLENGES IN A BUDGET-CONSTRAINED ENVIRONMENT.

The near-term demand for PERSISTENT INTELLIGENCE, SURVEILLANCE, AND RECONNAISSANCE (ISR) far outstrips the Department of Defense’s (DoD) current capacity. Ultra-long endurance platforms are one piece of the solution, allowing increased coverage at longer distances with fewer total aircraft.

In the longer term, DoD faces similar challenges in insufficient quantities of LONG-RANGE POWER PROJECTION assets in anti-access/area denial (A2/AD) environments. Extending aircraft endurance beyond the limits of the human pilot through aerial refueling would allow uninhabited combat aircraft to augment the limited numbers of existing human-inhabited aircraft at an affordable cost.

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AIRCRAFT NEEDED TO SUSTAIN ONE 24/7 ORBIT AT RANGE

HUMAN-INHABITED

8-HR ENDURANCE

UNINHABITED

24-HR ENDURANCE

UNINHABITED

100-HR ENDURANCE

600 NM

1,500 NM

2,700 NM

N/A

N/A

N/A

NOTE: SINCE THESE ARE DIFFERENT AIRCRAFT DESIGNS, THEY ARE EXPECTED TO HAVE DIFFERENT CRUISING SPEEDS. CALCULATIONS ARE BASED ON: 312 KNOT CRUISING SPEED FOR 8-HOUR ENDURANCE AIRCRAFT; 200 KNOT CRUISING SPEED FOR 24-HOUR ENDURANCE AIRCRAFT; AND 77 KNOT CRUISING SPEED FOR 100-HOUR ENDURANCE AIRCRAFT.
THE VALUE OF MISSION ENDURANCE:
AFFORDABLE POWER PROJECTION

WHILE THE UNITED STATES HAS TO DATE PRINCIPALLY USED UNINHABITED AIRCRAFT WITH LONG UNREFUELED ENDURANCE, THE SAME ADVANTAGE APPLIES TO AIRCRAFT THAT EXTEND THEIR MISSION ENDURANCE THROUGH AERIAL REFUELING.

64 DAYS is the longest aircraft flight ever recorded in a record set in a Cessna 172 in 1958.

2015 APRIL the Navy demonstrated automated aerial refueling in limited conditions with its X-47B experimental uninhabited aircraft.

Increased mission endurance is particularly valuable in A2/AD environments, where adversary long-range missiles will force the U.S. military to project power from farther away.

UNINHABITED COMBAT AIRCRAFT ENABLE AFFORDABLE LONG-RANGE PERSISTENT POWER PROJECTION.

HUMAN-MACHINE COMBAT TEAMING
In a budget-constrained environment, teaming traditional human-inhabited aircraft with uninhabited combat aircraft is a key innovation for countering A2/AD capabilities.

“LOYAL WINGMEN” uninhabited aircraft augment human-inhabited fifth-generation aircraft by providing additional sensors and missiles at relatively low cost. Uninhabited aircraft are highly automated and controlled at the mission level by human-inhabited aircraft via protected communications links.

For more on uninhabited and autonomous systems:
"Robotics on the Battlefield Part I: Range, Persistence, and Daring" by Paul Scharre (May 2014)
"Robotics on the Battlefield Part II: The Coming Swarm" by Paul Scharre (October 2014)

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