

Hybrid Airship History

Steve Huett

Director

*Advanced Development Program Office
for Airship Concepts*

March 2010



Agenda

- ADPO Categories
- Early History
- Recent History
- Future



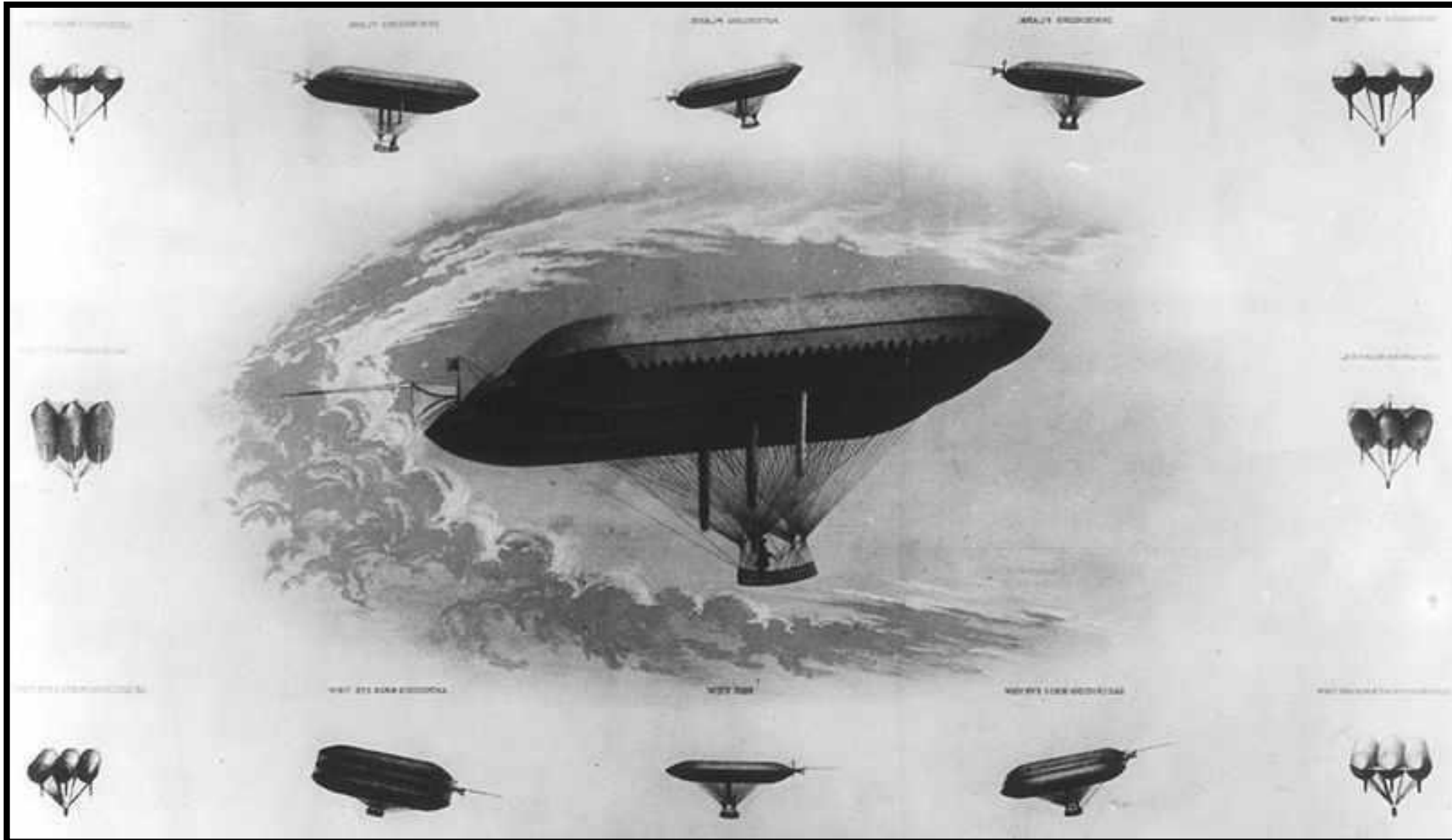
Hybrid Airship

Navy Lighter Than Air Mission Categories

- **Category 1: Near Shore/Port/Urban Areas/Facilities Surveillance**
 - MZ-3A General Purpose Surveillance
 - Sensor/Crew PL: 1-4 thousand lbs, Mission Period: 8-12 hrs
 - Affordable** Presence, Low Risk, **Available NOW**
- **Category 2: Off Shore Patrol: Affordable Airborne Presence**
 - Build Large Modern Classical Airship capable of carrying 10-30T
 - Mission periods: weeks vice hours with crew and UAV's aboard
 - Surveillance out to 500 miles from coast with “UAV Quick Look”
- **Category 3: Trans-oceanic Heavy Lift:**
 - Develop Hybrid Aircraft:500T payload for “From Fort to the Fight”
 - Insert “ready-to-fight” forces into austere AOR (no forward support)
 - Not susceptible to torpedoes/mines; high cargo survivability
 - Faster than surface ship (70-100 kts) / use ¼ fuel reqd for HTA
 - 30T variant: CISR/TACAMO/SOF Insertion/Sea Base Connector
- **Category 4: Strat-Sat: (HAA Airships and Balloons)**
 - Unmanned, 70,000 ft altitude, fill Near Space Gap by 2012
 - Relatively cheap alternative to satellites
 - 325 NM LOS, 332,000 sq-NM Collection Footprint
 - Increase DoD Com Network Resilience



HYBRID Early History



Solomon Andrew's airship 'Aereon', in which he proposed to cross the ocean during the Civil War, 1863

HYBRID Early History

- 1905, Alberto Santos-Dumont made what is likely the first attempt at a hybrid aircraft in 1905.
- His *Number 14* combined an airship envelope with an airplane frame.
- All of his previous flights had been made in purely aerostatically lifted airships.
- The Number 14 proved unworkable.



HYBRID Early History

- One hybrid aircraft design that flew was the Aereon 26, 1971
- This was a small-scale prototype and derived all its lift aerodynamically, none from lighter-than-air gas.
- The development of this aircraft was documented in the book "The Deltoid Pumpkin Seed" by John McPhee.



HYBRID Early History

- The 1986 Piasecki PA-97 Helistat combined four helicopters with a blimp in an attempt to create a heavy-lift vehicle for forestry work



HYBRID Recent History

Definition of Hybrid Aircraft

A hybrid airship is an aircraft that combines characteristics of heavier-than-air, (HTA), (fixed-wing aircraft or helicopter) and lighter than air, (LTA), technology.

For the purpose of this brief we consider a Hybrid Aircraft a High Lift Airfoil shaped airship that derives a significant portion of its lift from its aerodynamic shape and forward motion. (~30% Dynamic 70% Static)

HYBRID Recent History

FY-00 LTG Mike McDuffy, USA JCS/J4 witnesses SKYKITTEN

- Scaled version at 12 meters called "SkyKitten", built by Advanced Technologies Group, flew in 2000.
- While witnessing Skykitten flight envisions the ability “to embark ready to fight heavy combat force from its training base and deliver it thousands of miles away into a remote area without an air or seaport (From the Fort to the Fight)” within a week without loss of unit cohesion!



HYBRID Recent History

FY-01 JCS/J-4 funded the “SkyCat 1000 Engineering Study”

- Defined military utility of SkyCat 1000.
- Described baseline SkyCat 1000 operational flight characteristics
- Examined vulnerability to natural hazards and typical manmade threats.
- Technical/analytical studies



HYBRID Recent History

FY-02/03 JCS/J-4 funds NAVAIR HYBRID study

- VADM Holder / VADM Moore (N4)
- NAVAIR multi-disciplined team performed a risk assessment of the Hybrid airship enabling technologies and concluded the HYBRID Aircraft is low-medium risk to proceed to up to a 500 ton payload derivative



FY-04 OSD AT&L recruited DARPA to oversee prototype Hybrid development with NAVAIR assistance

- Mr. Wynne OSD AT&L tasked NAVAIR team to propose a development path to demonstrate a 30-50 ton Hybrid Airship
- Insert “ready to fight” combat elements in spite of anti-access measures
- Asses utility of 30T payload HAMR (Hybrid Aircraft Multi-Role) as Connector for Navy Forward Sea Base, Sea Shield CM Defense and ForceNet C4ISR



HYBRID Recent History

**FY-05 Lockheed Martin awarded WALRUS contract,
FY-06 developed P-791 with IR&D after WALRUS termination**

**Beneficiary of
the WALRUS
program**



**First Manned Flight of a Hybrid Aircraft: 29 Jan 06, PMD, CA N791LM
Focus: Development/Optimization of Digital Flight Control, Pilot Techniques,
Simulator and Air Cushion Landing System**

HYBRID Recent History

Other beneficiary of the WALRUS program



The Aeroscraft, a design proposed by Worldwide Aeros Corp is a hybrid airship that uses a lifting body shape, vectored thrust, as well as buoyancy control.

HYBRID Recent History

Other beneficiary of the WALRUS program



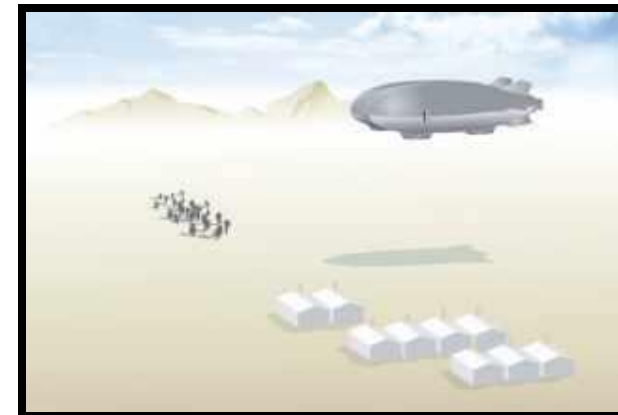
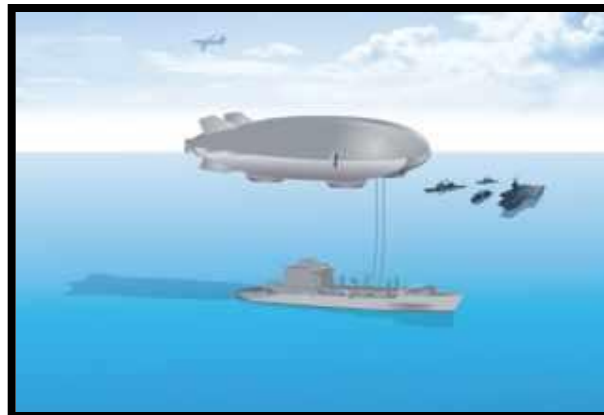
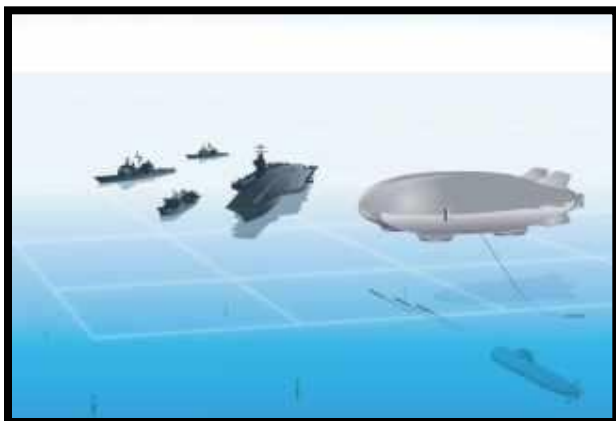
The cargo-hauling SkyCat-20, proposed by World Skycat features retractable hover-cushion engines that allow for vertical takeoffs and landings and can also be reversed, eliminating the need for a ground crew or handling equipment.

HYBRID Recent History

FY-06/07 NAVAIR re-engaged with JCS/J-4, briefed CoCOMs on Hybrid Airships capability to:

- Embark a cohesive, ready-to-fight military unit and deliver it to a war zone anywhere in AOR within 3-5 days, independent of air or seaports
- Deliver humanitarian relief to disaster areas without reliance on air or seaports (exploit lakes and rivers)
- Avoid land and seaborne threats: mines, torpedoes, IEDs and infrastructure interdiction

FY-07 EUCOM/J8 (MGEN Remkes / Mr. John Tillson) declares Hybrid Airship need to OSD (AT&L) and Joint Staff





HYBRID Recent History



FY-08 PERSIUS (Persistent Elevated Reconnaissance Surveillance Intelligence Unmanned System)

- **OSD requested NAVAIR PMA-262 initiate JCTD for Hybrid ISR platform that could carry a payload of at least 2,500lb to 20,000ft for two weeks. At 20,000ft, the payload line-of-sight would be 173 miles.**
- **PERSIUS was to be optionally piloted**
- **PERSIUS JCTD was approved at the Joint Capabilities Board but did not receive any service support**
- **~Feb 2009 PERSIUS initiative transferred to the IRS Task Force and renamed LEMV**

HYBRID Future

“Mr. President, we cannot allow an Airship Gap!”



 **KIROV AIRSHIP**