

Lighter Than Air Vehicle Heavy Lift Cargo Transportation & Logistics In Africa



Background Due
Diligence Information

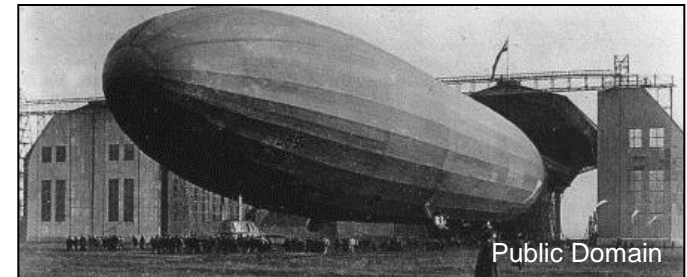
Jan, 2012

Tunis – Cape Town: ~4,400nm

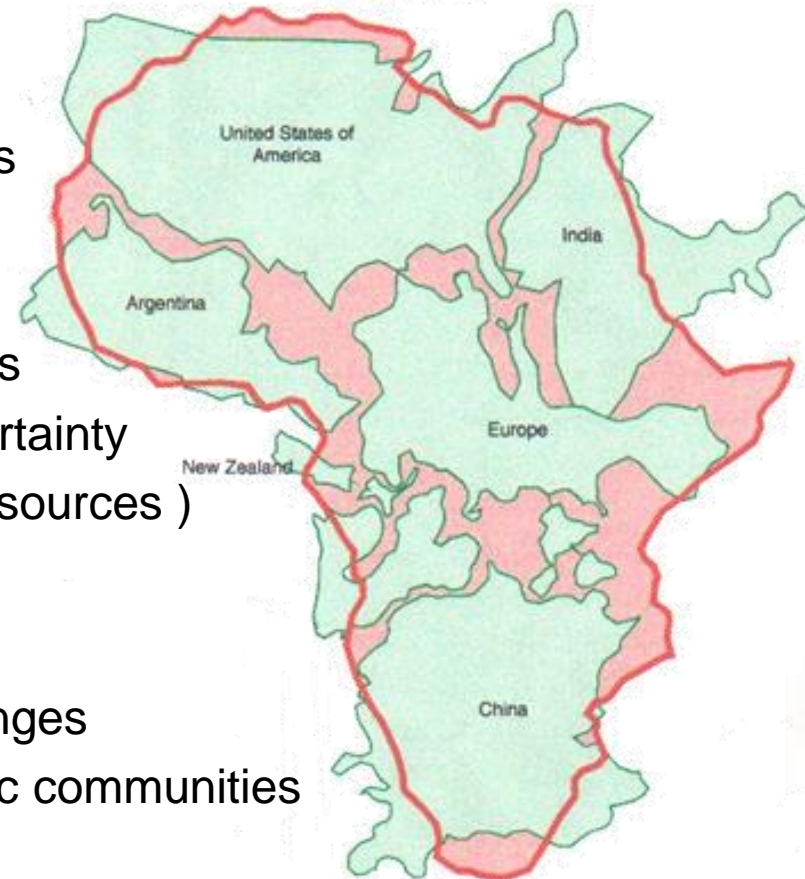
“The 1917 African Raid” – Zeppelin L-59 – Historical Testament On LTA Feasibility



- Mission Goals:
 - 1917 L.59 mission to relieve German ground forces in East Africa
 - Deliver food, medical supplies and ammunition to front lines
- Flight Details:
 - ~50 tons payload
 - Flight Time: 95 Hrs 10 Min
 - Distance Flown: 4,200 Miles
 - Max Altitude: 9,850 ft; Av. Speed: ~44mph
- Mission accomplishments:
 - Recalled on Nov 23, 1917 in belief that defeat of East African based German forces was imminent
 - Record breaking – proving Airships capability cargo carriage operations



- Complex:
 - 11.7 million square miles (~3.5 times size of USA)
 - 53 Nations, 1 Billion people, Over 800 ethnic groups and 1000 languages
- Geographically, very challenging and ostensibly, underdeveloped
- Multiple issues:
 - Piracy, Terrorism & Extremism
 - Undergoverned areas - irregular militaries
 - Dependence on Foreign Assistance
 - Pandemic Disease –HIV/AIDS
 - Insufficient Means to Confront Challenges
 - Ethnic and religious strife – political uncertainty
 - Trafficking – exploitation (pilferation of resources)
- Opportunities:
 - Growing economies
 - Increasing political will to confront challenges
 - Promising regional security and economic communities
 - Increasing democratization



A 21st Century LTA Transporter In Africa?



- Payload, size and weight - Barge-like
- Unrefueled range - Ship-like – beats ‘tyranny of distance’
- Low cost cargo carriage
 - ~\$0.25 ton.mile – Truck-like
 - Greener footprint – Less fuel used
- VTOL at Max Operating Weight - Helicopter-like
- Offshore or seabase support
- Inter-modal - “Sans Frontières”
- Airfield/Runway independent
- Flight/Payload off-load goal is to be independent of any vehicle ballast that is not carried organically to the vehicle



The Principal Challenge – A Pressing Need To Address The Cargo Off-load Challenge



Zeppelin Managing Director Thomas Brandt says “...[he] is also skeptical about using them for outside cargo transport...[he] points out that ‘major technical issues are not yet resolved.’ Most pressing is the problem of off-loading cargo without the [airship] instantly becoming too light.”

Aviation Week & Space Technology/July 11, 2011

For Practicable Cargo Transportation Capability Across The African Continent, A 21st Century Technology Approach Is Necessary – *Not Your Father's Airship Technology!*



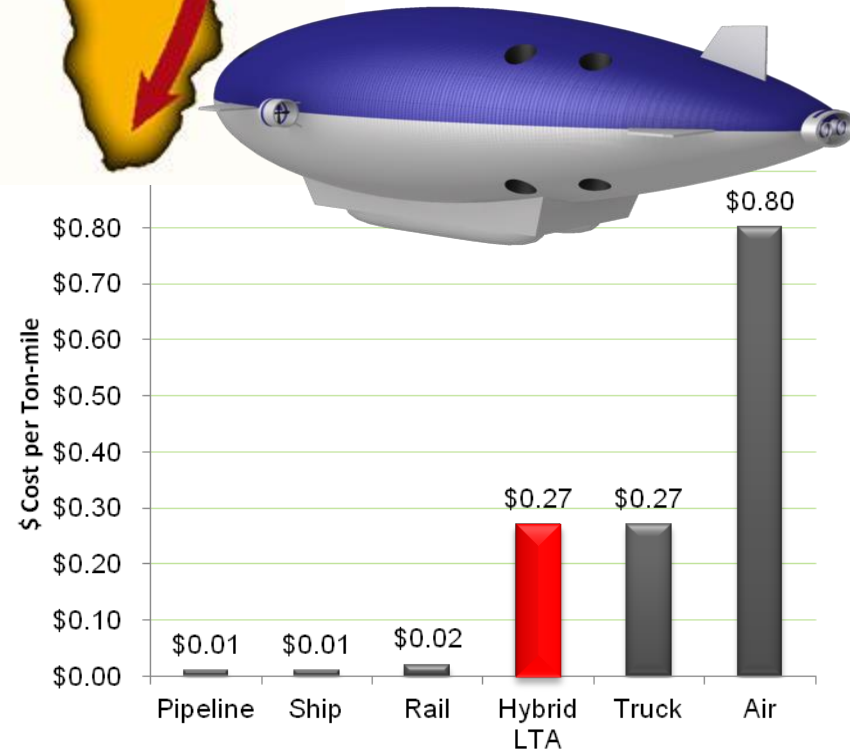
- EUCOM/AFRICOM studies identified the need for a new heavy lift capability – to deliver within 3-5 days a ready to-employ, task-organized element up to brigade-sized or equivalent, to or from a point-of-need, independent of receptive infrastructure
- Assessed that technology could deliver:
 - Near-term (2010-2013) 3 years
 - Mid-term (2014-2017) 7 years
 - Long-term (2018-2025) 15 years

Note: These 2010 time frames probably remain realistic subject to a commitment to proceed.

LTA Cost Of Operations



- London-Cape Town:
 - ~6,000 miles
 - 747 Range ~6,000m – decrements 747-400 payload from 113t to 98t
 - 747-400 sortie time: 9.1 hrs
 - Fuel cost \$2.13 per gal
- Hybrid LTA
 - 500 ton p/l
 - @ 90 kts – flight time ~60 hrs
 - Fuel cost \$2.13 per gal
- Hybrid airship offers ~1/3 cost of 747-400 in terms of ton.mile costs



- **Advanced Hybrid LTA operation:**
 - Vertical take-off and landing (VTOL) at maximum operating weight
 - Hover at maximum operating weight
 - Operates without the use of water ballasting or Helium/Hydrogen venting
 - Off-load of payload without the use of off-board ballast
 - Full air taxi capability
 - Carries own consumables

- **Hybrid LTA - LEMV:**
 - Limited vertical take-off and landing (VTOL) if in LTA mode
 - Limited hover unless in LTA mode
 - Requires water ballast and Helium or Hydrogen venting for vertical operations
 - Likely requiring off-board ballast to compensate payload off-load
 - Limited air taxi capability
 - Requires off-board ballast weight addition to compensate fuel burn system

In Development Of CONOPS Need Careful Consideration Of Practicable Operating Capability Of Hybrid Airship And To Apply Realistically

LEMV – A Baseline For Transportation LTA



- ISR Hybrid capabilities
 - 3-week endurance
 - 2,500 lb payload
 - Operating altitude 20,000 ft
 - 80 knot dash – 20 knot loiter
 - 16 kW power
 - Reduced footprint (e.g helium supply)
- Hybrid Airship Universal Logistics Demonstrator (HAULD)
 - Employ same basic shape, envelope and propulsion system as for LEMV
 - Modify gondola for cargo carriage
 - Adjust variable of payload, unrefueled range and altitude to comport LEMV for a logistics mission
 - Logistics variant could be developed in parallel with ISR vehicle

LTA Concepts Have Implications



- Logistics Strategy:
 - Phased delivery of ready to use modules at point o need
 - Implications for intercontinental movement directly to point of need/distribution – close to point of use
- Organization:
 - Able to operate at airfields in austere environments
- Personnel:
 - Man airship like a Navy ship (captain and crew)?
- Facilities:
 - Operating autonomy of air vehicle (eg. Is there a need for helium/hydrogen top up? Ballast water?)
 - VTOL or not VTOL has a huge impact
- Policy:
 - FAA/CAA etc
 - HAZMAT/Safety issues – learn lessons of history (eg 21st Century Hindenburg)
 - Hard stores, fuel, water, personnel carriage – issues?