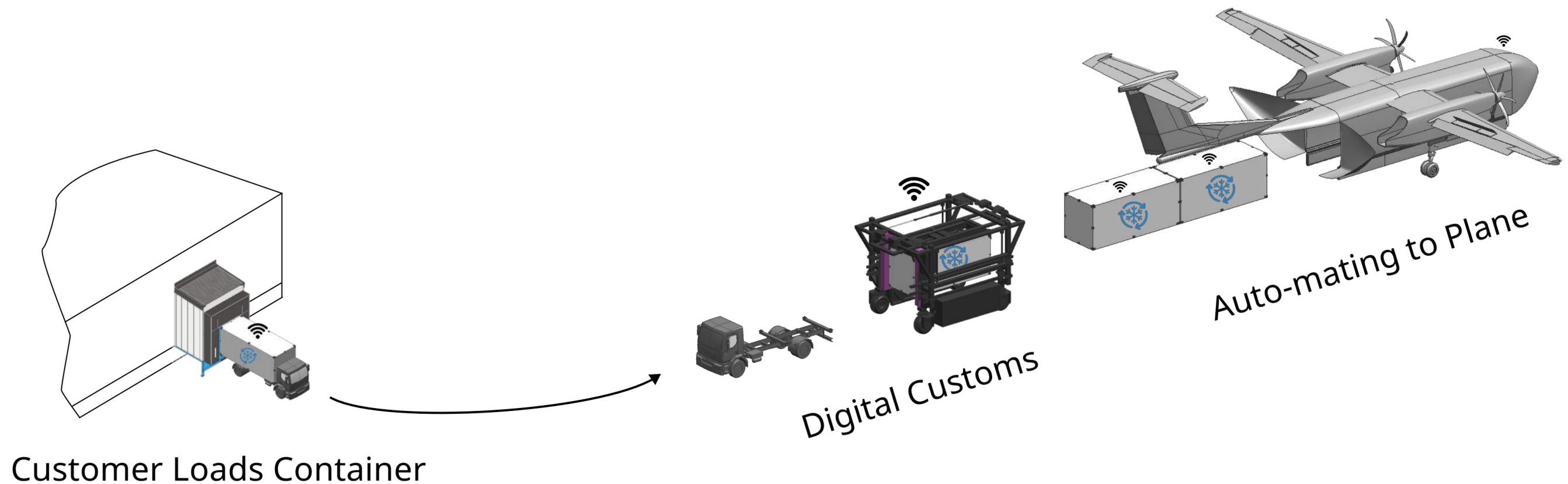


# BYBLOS

## Pharma Cold Chain Reimagined

*Near-Zero Spoilage. Under-a-Day Global Delivery. 60%-70% Lower Cost.*



“One Container → One Power Plug → No Dry Ice → No Repacking → No Cold-Storage Hubs”

# Pharma is High-Value Cargo With Rising Air Logistics Demand

- ~**0.5 million metric tons (m.t.)** shipped by air annually
- Only **1.9%** of global air freight volume, but 2.6% of airline cargo revenues
- **3.5 million m.t.** shipped by sea (7x air volume)
- Air is **15-20x more expensive** but essential for:
  - Biologics
  - mRNA
  - Cell & gene therapies
  - Temperature-sensitive APIs
- Growth strongest in emerging markets (Asia, LATAM, Middle East, Africa)
- Failures persist due to:
  - Dry ice limits
  - Repacking
  - Cold rooms
  - Multi-hub handling
  - Airport dwell time



	Available Airports	
	777F	Byblos
Africa	12	1,200+
LATAM	18	300+
Indonesia	10	150+
Middle East	19	250+

***“Small in volume, outsized in value — and highly sensitive to cold-chain failures”***

# The Pharma Cold Chain is Manual & Resource-Heavy

**Global losses from temperature failures: \$35B+ per year**

Cold-chain food losses (technology overlap): \$200B+ per year

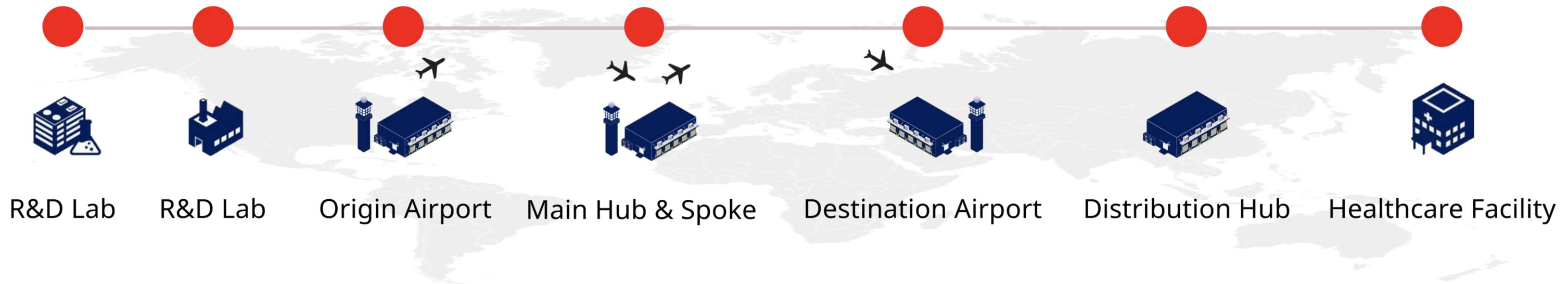
## Why pharma cold chain fails today:

- Dry ice dependency
- Insulated and expensive packaging waste
- High labor use
- Multiple re-icing events
- Airport cold-room storage
- Manual cargo reconfiguration
- Fragile ULD's with tare-weight penalties
- Limited airport accessibility



***“Every breakpoint increases cost, labor, and spoilage risk”***

# Pharma Cold Chain Today: Too Many Breakpoints



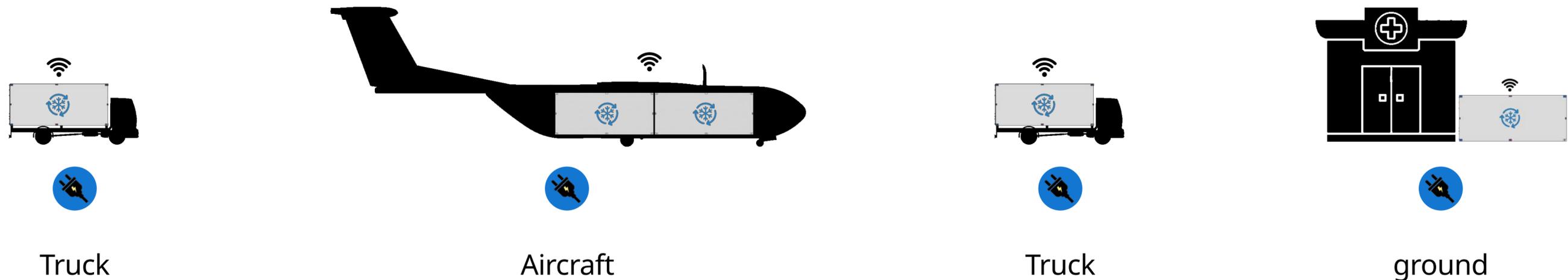
At every step:

- **Re-icing required**
- **Repacking required**
- **Temperature exposure risk**
- **Cold storage required**
- **Manual handling + PPE**
- **ULD constraints + tare weight**

***“Pharma pays for complexity it did not create— and cannot control”***

# One Container. One Power Plug. No Dry Ice. No Repacking.

First global end-to-end intermodal active-refrigerated system from factory to patient



Byblos Omnimodal System (BOS<sup>1</sup>):

- **20ft ISO-compatible active-refrigeration container— fits into existing factory/reefer workflows**
- **Continuous dual-redundant cooling across truck → aircraft → truck → healthcare facility**
- **3-hour emergency battery + external plug-in at every step**
- Digital tracking, seal integrity, x-ray digital customs capable
- Moves from factory → aircraft → healthcare facility with the same container

***“Load once at the factory. Deliver the same container to the healthcare facility”***

<sup>1</sup>BOS (Byblos Omnimodal System) compatible with existing intermodal networks and our converted aircraft

# BOS Removes 6 Major Pharmaceutical Cost Drivers

→ Saving pharma **\$40B-\$60B+** annually

- **\$3.5B-\$4.5B** in dry ice production, storage, PPE, and handling
- **\$7B-\$10B** in single-use insulated packaging & ULD<sup>1</sup>-liners
- **\$12B-\$18B** in manual labor for dry-ice handling, repacking, & ULD workflows<sup>1</sup>
- **\$8B-\$12B** in airport & intermediate cold-storage facilities
- **\$10B-\$15B** in distribution hub costs (re-icing, re-packing, buffer storage)
- **\$1B-\$1.5B+** in ULD<sup>1</sup> repair, repositioning & storage (eliminated)

<sup>1</sup>Unit Load Device = aircraft container in use today

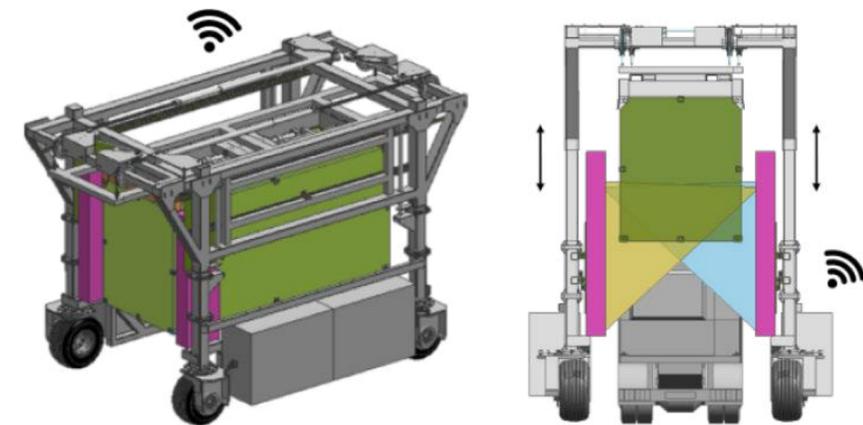
# Automating the Pharma Chain End-to-End

## AI-Driven Customs, Automated Mating, X-Ray, and Smart Routing

*“Removes 98% of cold-chain logistics labor”*

Byblos automation:

- Automated boxing of regular packaged vials
- Automated palletizing at factory
- Automated BOS<sup>1</sup> loading
- Digital customs pre-clearance
- X-ray during handoff (straddle carrier)
- Automated mating to aircraft
- Container-level security / seal integrity
- Direct delivery to healthcare facilities



Byblos Straddle Carrier X-ray Capable



Digital  
Customs

<sup>1</sup>BOS (Byblos Omnimodal System) compatible with existing intermodal networks and our converted aircraft

# Pharma Air Transport Comparison (1M Vaccine Doses)

*“Your existing 20ft reefer workflows — now flying with continuous active refrigeration”*

## Traditional: 777F / Dry Ice

- Dry-ice constrained
- Insulated packaging + ULD tare weight
- High labor at factory
- High labor at airport
- Repacking + re-icing at each breakpoint
- Cold rooms required at airports
- Limited global airport access (~1,300 airports)
- No active cooling in flight<sup>2</sup>
- Higher exposure risk (3-5% spoilage)



777F

## Byblos: Dash 8-400/BOS

- 20ft ISO-compatible active-refrigeration container
- Continuous cooling in air + on ground
- No dry ice, no insulated waste, no repacking
- Single GMP-controlled environment from factory → patient
- < 0.1% spoilage risk with continuous AI monitoring
- 5x airport reach → enables direct access to underserved regions
- ~55% fuel burn reduction
- 60-70% air-freight cost reduction
- Opportunity for 98% reduction in cold-chain logistics labor



Byblos De Havilland Dash 8-400

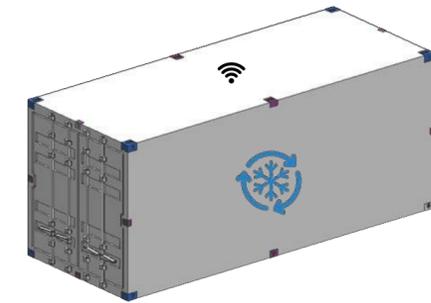
<sup>1</sup>All figures normalized to ~1M vaccine doses (~24,000 lbs total payload; 2x BOS containers at 12,000 lbs payload each; multiple vial assumption 8-10g per dose)

<sup>2</sup>Some companies are now offering ULDs with batteries for cooling with limited time (~10-13 hrs) and significant added weight penalty due to the batteries

# Why Pharma Is the Perfect Entry Market

## Pharma cares about:

- Temperature control integrity
- Regulatory reliability
- Supply chain transparency
- Low spoilage
- Rapid distribution for biologics
- Access to remote regions
- Reducing dependency on widebody cargo aircraft
- Eliminating dry ice + PPE + insulated (costly) packaging waste



***“BOS<sup>1</sup> delivers all of this — at dramatically lower cost and with higher resilience”***

<sup>1</sup>BOS (Byblos Omnimodal System) compatible with existing intermodal networks and our converted aircraft

# The Byblos Aircraft Advantage

*“A 20ft ISO active-refrigerated warehouse that flies — built into the aircraft itself”*

- **BOS container is part of the aircraft structure** → true no-tare-weight penalty (unlike ULDs)
- **20ft ISO-compatible container** → pharma loads exactly as they do today (**no change in plant operations**)
- **Continuous active refrigeration becomes part of the aircraft architecture** → not an add-on battery ULD
- **Container bays designed around GMP workflows** → eliminates all intermediate handling
- **Regional turboprop platform (Dash 8-400)** enables direct-to-region missions, avoiding mega-airport bottlenecks
- **Aircraft accepts BOS modules with automated mating** → faster ground turns, no cold-chain exposure
- **Single power + continuous cooling environment**, effectively makes the aircraft a flying refrigerated warehouse
- **Conversion architecture reduces FAA certification time** → faster market entry for pharma corridors
- **Compatible with intermodal handoff** → truck → aircraft → truck → healthcare facility with zero breakpoints



ULD

(Unit Load Devices / aircraft containers)

*“Result: Direct, GMP controlled, <24h global delivery with no cold-chain exposure”*

# IP, Certification, and System Maturity

**Byblos has the only patented container-as-aircraft structure in the world**

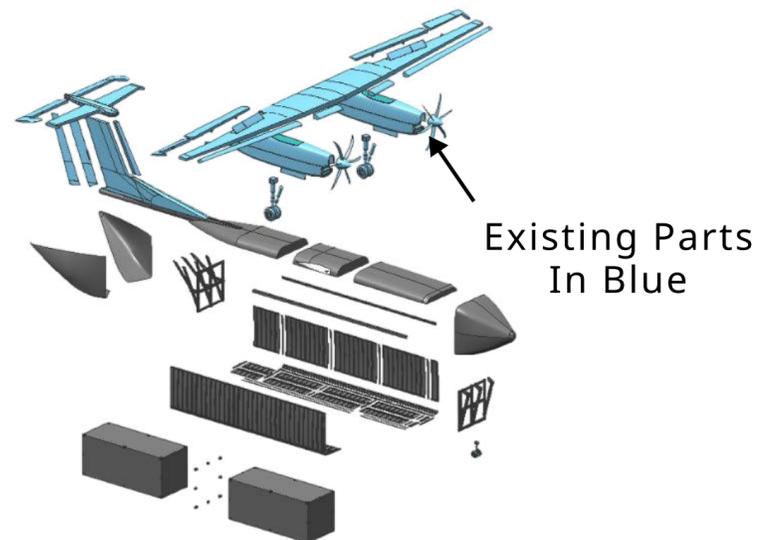
- **50+ global patents** (container-as-aircraft-structure, active-refrigeration omnimodal container, spine-container structural load path, post-buckled fairing for lighter weight, etc.)
- **Patents extend through 2038**
- **Approx. 70% completed Preliminary Design Review (PDR)**
- **Byblos invested \$4.5+M to date to eliminate risk**
- BOS economics includes **using 100% Renewable Aircraft Fuel (RAF)**
- Based on existing aircraft → **conversions reduce FAA certification time**



Dash 8-400 F-LCD



Dorsal® Dash 8F



8X LD3 Containers = 1,224 FT<sup>3</sup>



2X BOS Reefer (88% More Cargo Vol.)= 2,300 FT<sup>3</sup>

# Go-to-Market: Pharma Wedge → Global Rollout

## Phase 1 (0-24 months)

- Minimum Viable Product (MVP) Dash 8-400 conversion
- Demo flights with pharma partners
- CEIV pharma compliance-enabled workflows
- AI customs + BOS digitization at airports

## Phase 2 (24-36 months)

- FAA certification
- First regional corridors (US pharma corridors / EU pharma corridors)

## Phase 3 (36-48 months)

- Global pharma network
- Healthcare-facility direct delivery
- Franchise rollout in 10 global regions
- Local IP-protected data-protected ownership structure

# Round A Investment Opportunity

**Raise: \$55M** (Min. investment for strategics \$2M)

## Use of Funds:

- MVP conversion
- Demo flights
- AI customs integration
- X-ray automation systems
- Manufacturing setup for BOS containers

## Investor Value:

- Up to 40x ROI potential by Year 5
- Pharma logistics cost reduction of >60%
- Zero dry ice footprint
- Zero insulated waste
- Zero repacking
- Near-zero spoilage (<0.1%)
- Global accessibility **unlocks new pharma markets**

# Contact

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## Team:



### **Elie Helou Jr. — Founder & CEO**

- 25+ years in aerospace engineering (McDonnell Douglas/NASA Projects)
- 50+ global patents & led \$800M+ devel. programs
- Founded multiple startups



### **Bill Wagner — President Wagner Aeronautical**

- FAA-certified DER for aircraft conversions
- Converted 757, 767, 777 aircraft; partner for rapid BOS aircraft rollout



### **Carla Lucchino — Chief Commercial Officer**

- Former Chief of Staff to the U.S. Secretary of the Navy
- 30+ years in military logistics & supply chain leadership

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