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Drafting out the fourth aviation revolution

"It takes a village…"

Jay Carmel

OliverWyman

April 25, 2023

"That we are demonstrating the practicability of aerial transport is due to the courage and the patience, the vision and the persistence of those who designed and built and flew the craft which have startled and inspired."

-1920 Aircraft Year Book, Issued by Manufacturers Aircraft Association, Inc.

Executive Summary:

- AAM is nearly here, but as beta version 0.1

- Transformational – and capable – aircraft are a necessary first step to inspire the revolution…

- …but the next 5-10 years will be paced by the development of the supporting ecosystem

- Continued coordination amongst investors, startups, and traditional aerospace is essential – especially in underappreciated areas (supply chain, MRO, fleet management)

Diverse AAM Market Paced by Aircraft Availability

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Relevant market segments & passenger use cases for AAM
Distribution of vehicle types and example aircraft OEMs
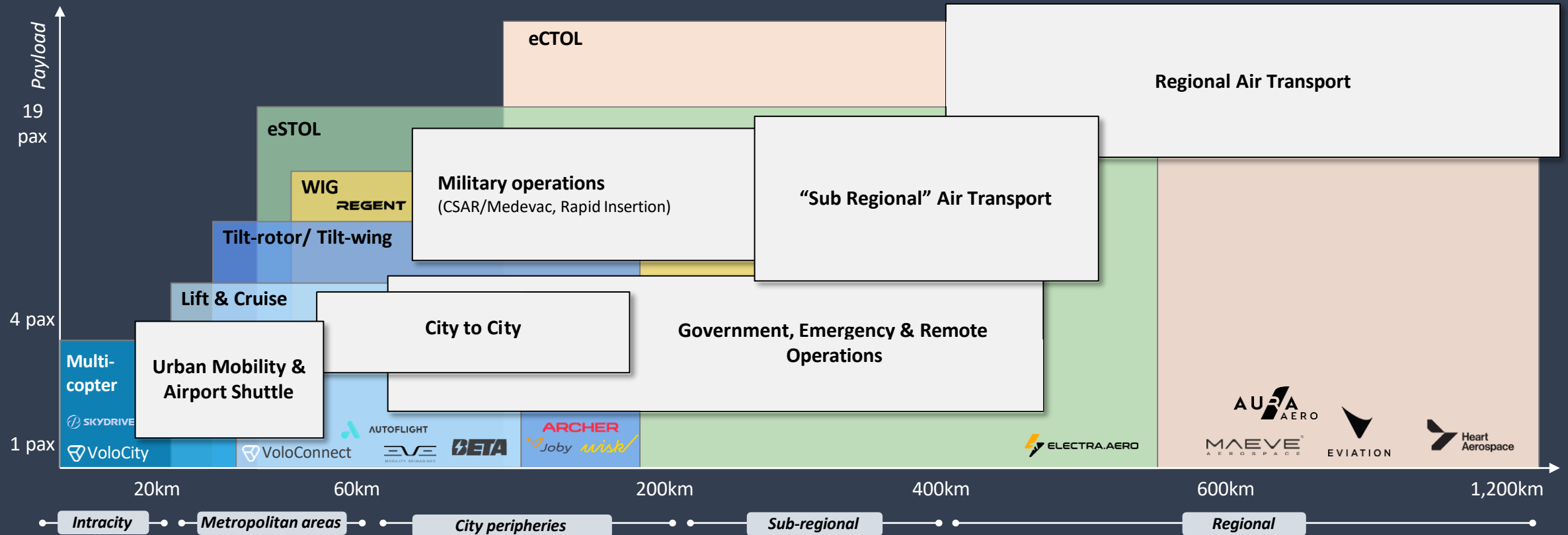
Mission and aircraft profiles are general estimates for illustrative purposes only; logos shown are representative examples, not exhaustive
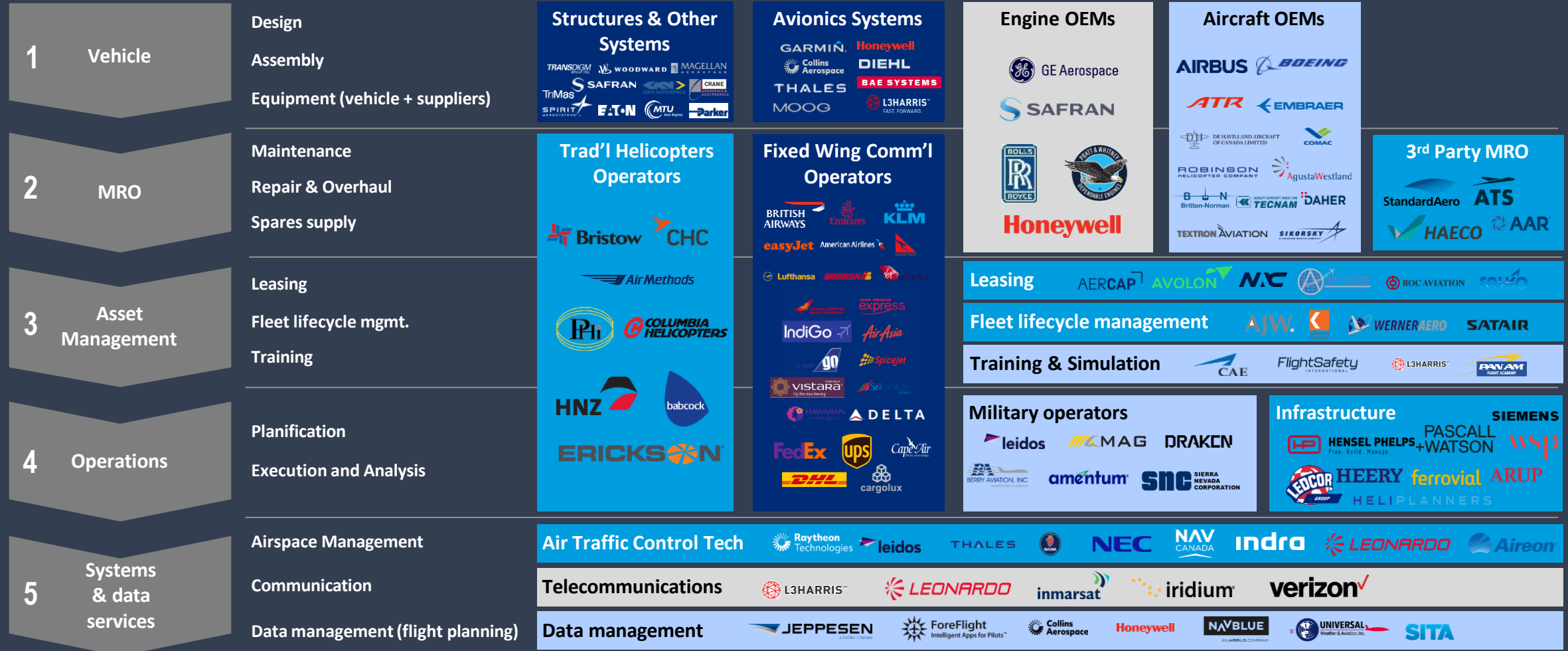Source: Oliver Wyman expertise and analysis

AAM Value Chain: Startups Stimulating the Market

Value Chain Components

Key players (illustrative and non-exhaustive)

1 Vehicle
- Design
- Assembly
- Equipment (vehicle + suppliers)

2 MRO
- Maintenance
- Repair & Overhaul
- Spares supply

3 Asset Management
- Leasing
- Fleet lifecycle mgmt.
- Training

4 Operations
- Planification
- Execution and Analysis

5 Systems & data services
- Airspace Management
- Communication
- Data management (flight planning)

Structures & Other Systems

Avionics Systems
XWING · NEAR EARTH AUTONOMY · Skyryse · uAvionix · PSIONIC · Vermeer · MERLIN LABS · RELIABLE ROBOTICS · DAEDALEAN APPLIED INTELLIGENCE

Powertrain Systems
Whisper Aero · DUXION · magniX · Evolito The Power of Electric Flight · VERDEGO AERO · H3X · ZEROAVIA · H55 · AMPAIRE · AXYAL · H3 Dynamics · Universal Hydrogen · kite magnetics

Aircraft OEMs
Joby · ARCHER · BETA TECHNOLOGIES · Heart Aerospace · EVIATION · SKYDRIVE · VOLOCOPTER · EVE MOBILITY REIMAGINED · PYKA · VERTICAL · ELROY AIR · LILIUM · wisk · overair · AUTOFLIGHT · ELECTRA · eHANG

3rd Party MRO
RoboticSkies

eVTOL Operators
MINT AIR · EVFLY · NEOM · WALLE

Leasing

Fleet lifecycle management

Training & Simulation — Loft Dynamics · FAST

Military operators

Infrastructure
skyportz · kookiejar · Skyports · AirNova · URBAN V · VPORTS · Urban-Air Port ltd · GROUPE ADP · VOLATUS INFRASTRUCTURE

Air Traffic Control Tech
uAvionix · SKYWAY · EVE MOBILITY REIMAGINED · Aloft · UNIFLY · ALTITUDE ANGEL · AIRMAP Powered by DroneUp · SkyGrid A Boeing SparkCognition Company · AURA · airspacelink

Telecommunications
uAvionix

Data management
ALTAPORT

Est. # of Companies: 5 - 10 | 10 - 50 | 50 - 200 | 200+

Source: Oliver Wyman analysis

AAM Value Chain: Startup Investment Totals

Value Chain Components

Key players (illustrative and non-exhaustive)

Value Chain Components		Key players

1 Vehicle
- Design
- Assembly
- Equipment (vehicle + suppliers)

2 MRO
- Maintenance
- Repair & Overhaul
- Spares supply

3 Asset Management
- Leasing
- Fleet lifecycle mgmt.
- Training

4 Operations
- Planification
- Execution and Analysis

5 Systems & data services
- Airspace Management
- Communication
- Data management (flight planning)

Structures & Other Systems

Avionics Systems $830M

Powertrain Systems $780M

Aircraft OEMs $10.2B

3rd Party MRO $10M

eVTOL Operators

Leasing

Fleet lifecycle management

Training & Simulation $30M

Military operators

Infrastructure $80M

Air Traffic Control Tech $1B

Telecommunications

Data management

Est. # of Companies 5 - 10   10 - 50   50 - 200   200+

Source: Oliver Wyman analysis, public investment information
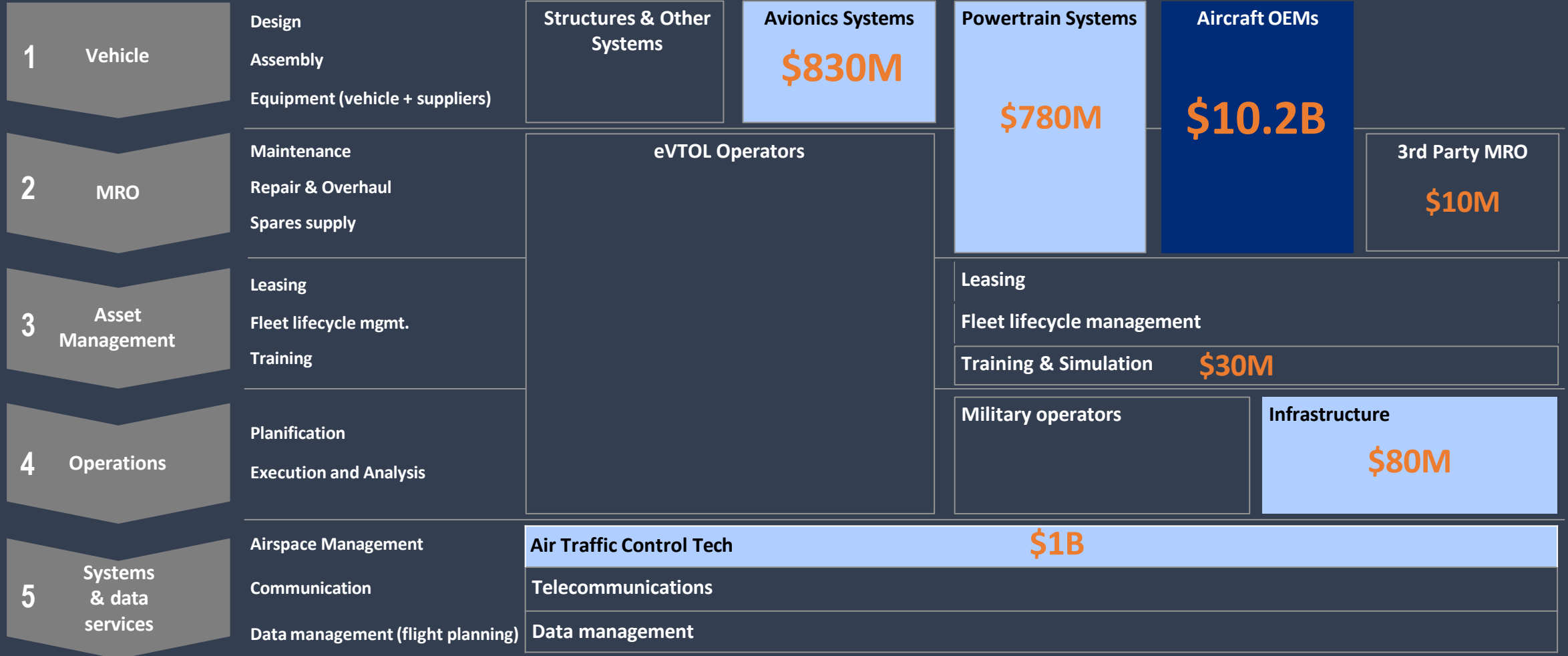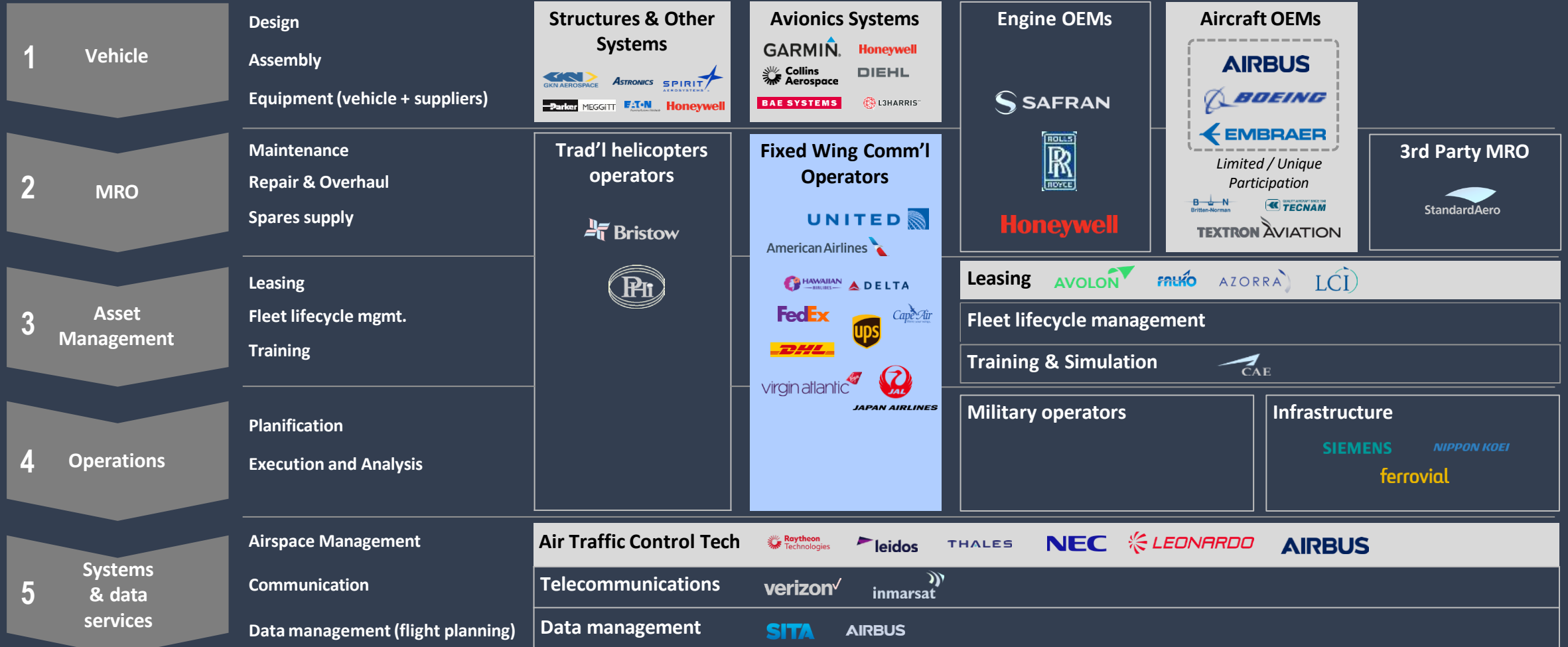
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AAM Value Chain: Trad'l Stakeholder Participation

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Value Chain Components

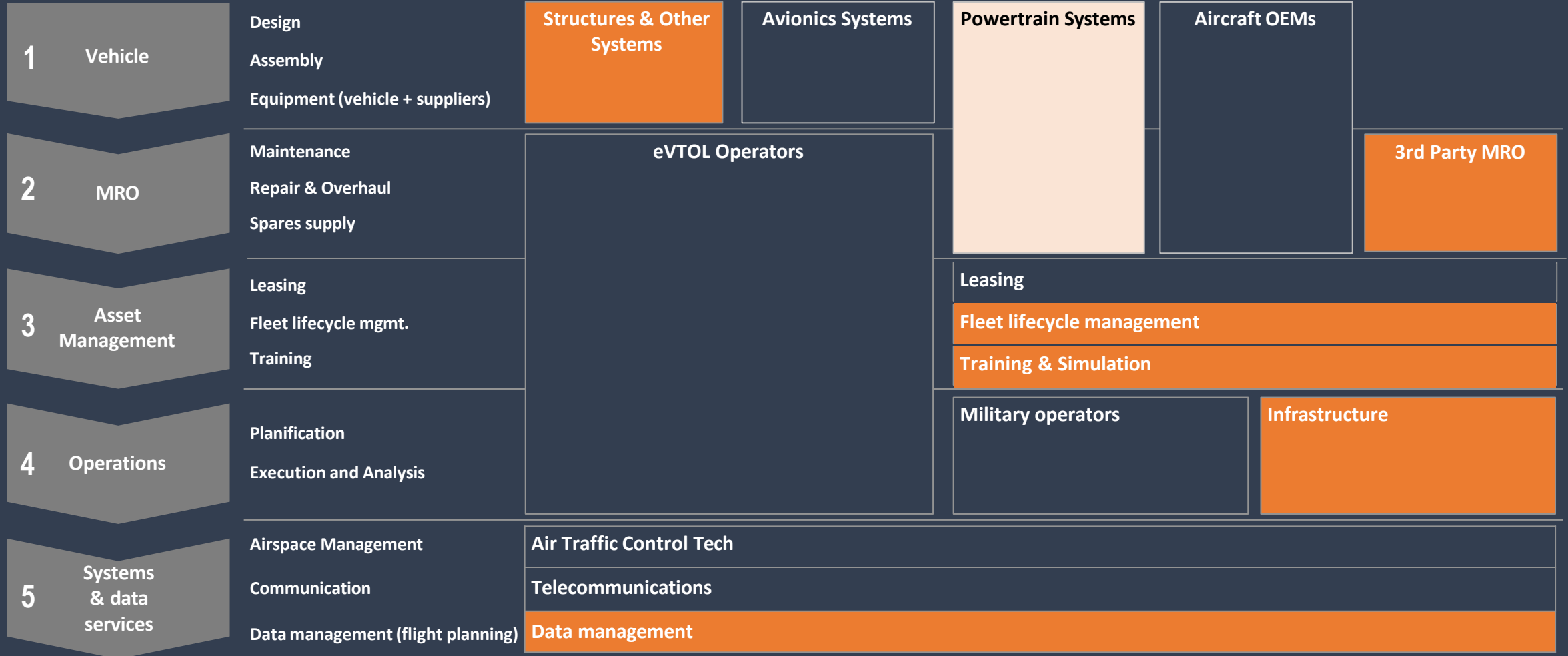**Key players** (illustrative and non-exhaustive)

#	Component	Sub-components
1	Vehicle	Design / Assembly / Equipment (vehicle + suppliers)
2	MRO	Maintenance / Repair & Overhaul / Spares supply
3	Asset Management	Leasing / Fleet lifecycle mgmt. / Training
4	Operations	Planification / Execution and Analysis
5	Systems & data services	Airspace Management / Communication / Data management (flight planning)

Structures & Other Systems
GARMIN · Honeywell · Collins Aerospace · DIEHL · GKN AEROSPACE · ASTRONICS · SPIRIT AEROSYSTEMS · Parker · MEGGITT · EATON · Honeywell

Avionics Systems
GARMIN · Honeywell · Collins Aerospace · DIEHL · BAE SYSTEMS · L3HARRIS

Engine OEMs
SAFRAN · ROLLS ROYCE · Honeywell

Aircraft OEMs
AIRBUS · BOEING · EMBRAER
Limited / Unique Participation
Britten-Norman · TECNAM · TEXTRON AVIATION

3rd Party MRO
StandardAero

Trad'l helicopters operators
Bristow · PHI

Fixed Wing Comm'l Operators
UNITED · American Airlines · HAWAIIAN AIRLINES · DELTA · FedEx · Cape Air · UPS · DHL · virgin atlantic · JAPAN AIRLINES

Leasing
AVOLON · FALKO · AZORRA · LCI

Fleet lifecycle management

Training & Simulation
CAE

Military operators

Infrastructure
SIEMENS · NIPPON KOEI · ferrovial

Air Traffic Control Tech
Raytheon Technologies · leidos · THALES · NEC · LEONARDO · AIRBUS

Telecommunications
verizon · inmarsat

Data management
SITA · AIRBUS

Est. # of Companies
5 - 10 · 10 - 50 · 50 - 200 · 200+

Source: Oliver Wyman analysis

AAM Value Chain: Areas Requiring Attention

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Value Chain Components

Key players (illustrative and non-exhaustive)

1	Vehicle	Design
		Assembly
		Equipment (vehicle + suppliers)

2	MRO	Maintenance
		Repair & Overhaul
		Spares supply

3	Asset Management	Leasing
		Fleet lifecycle mgmt.
		Training

4	Operations	Planification
		Execution and Analysis

5	Systems & data services	Airspace Management
		Communication
		Data management (flight planning)

Structures & Other Systems

Avionics Systems

Powertrain Systems

Aircraft OEMs

eVTOL Operators

3rd Party MRO

Leasing

Fleet lifecycle management

Training & Simulation

Military operators

Infrastructure

Air Traffic Control Tech

Telecommunications

Data management
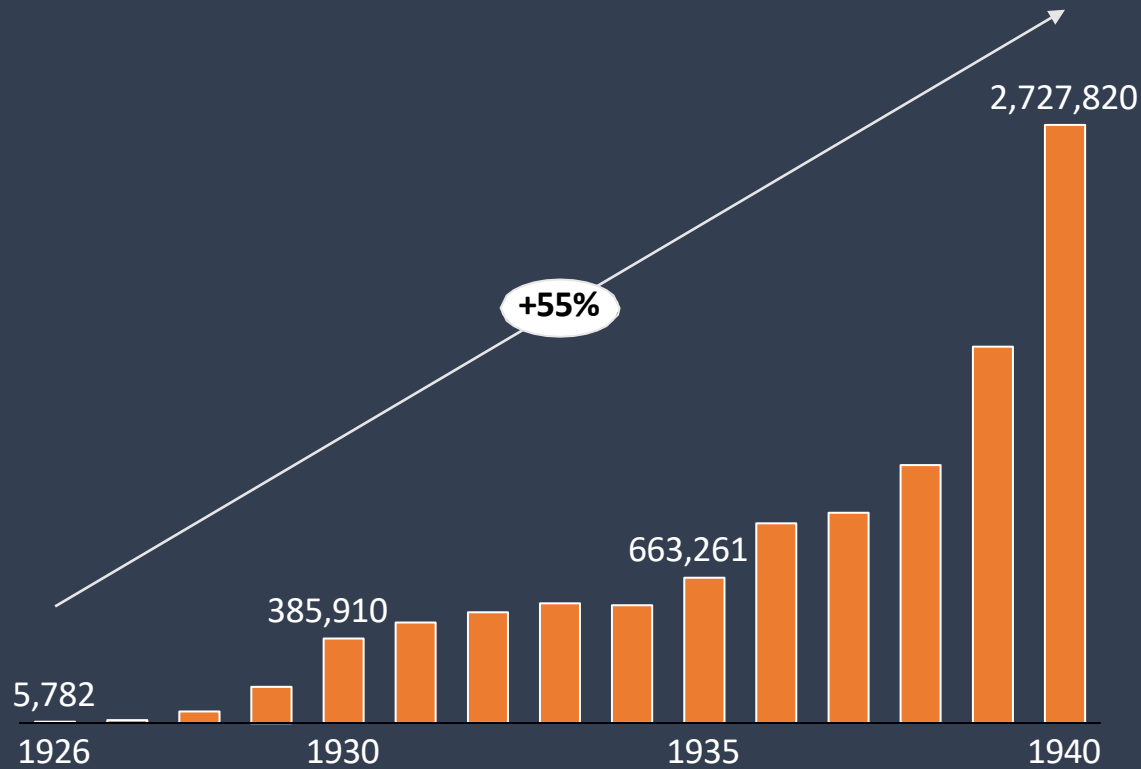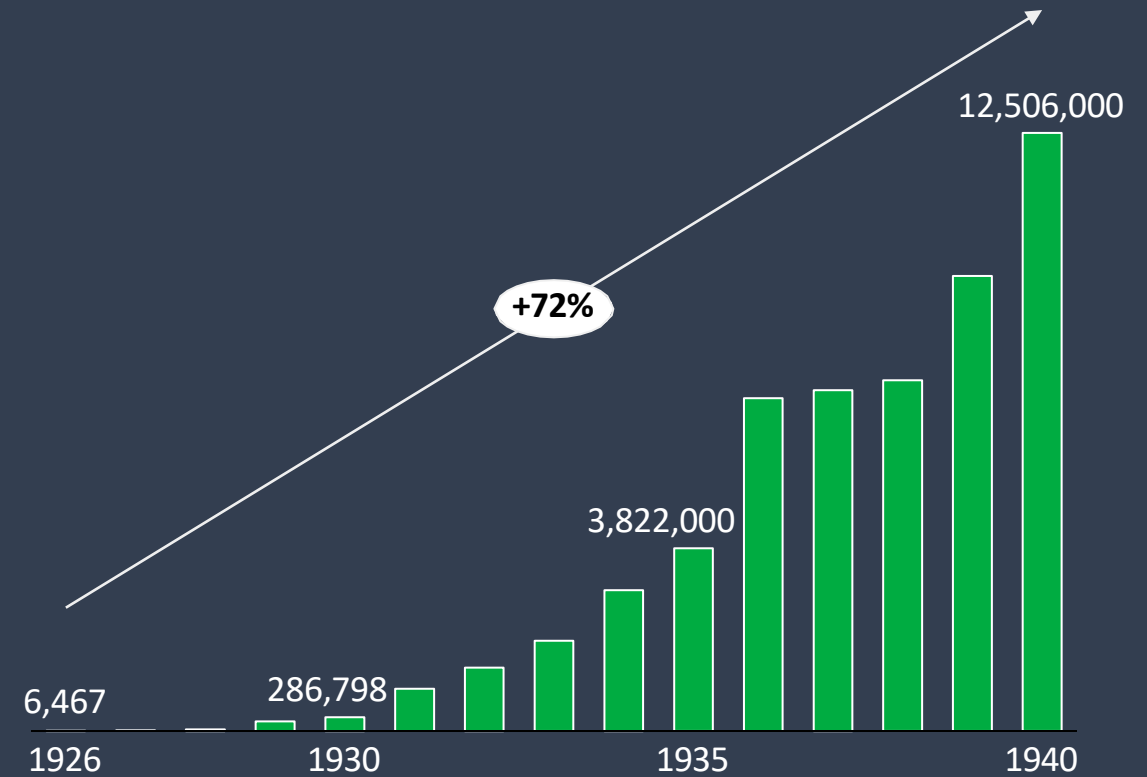
Key Takeaways

- Early market growth will depend on not only successful aircraft, but also capable supporting ecosystems
  - Stakeholders must consider the degree of ecosystem customization that is required to unlock diverse AAM opportunities (by geography, mission, aircraft type, etc.)

- Startups and traditional aerospace both have essential roles to play
  - Collaboration will accelerate the industry's evolution