EXAELIA

Flying Testbeds for Novel Long-Range Aircraft

Towards a European Experimental Aircraft– Governance, Business, and Funding models

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Funded by the European Union

Definition

An Experimental Aircraft (EA) is a specially designed or modified aircraft used to test new components, systems, or concepts, such as aircraft engines, flight control systems, or sustainable fuels.

The EXAELIA Project

Goal of EXAELIA:

- EXAELIA has as a goal to address the need for more radical changes in long-range (LR) aircraft configurations and propulsion concepts to **drastically cut the climate impact of long-range flights.**
- To **accelerate the potential entry-into-service** of such aircraft before **2050** and **de-risk their development**, EXAELIA aims to create a **modular, sub-scaled experimental aircraft**.

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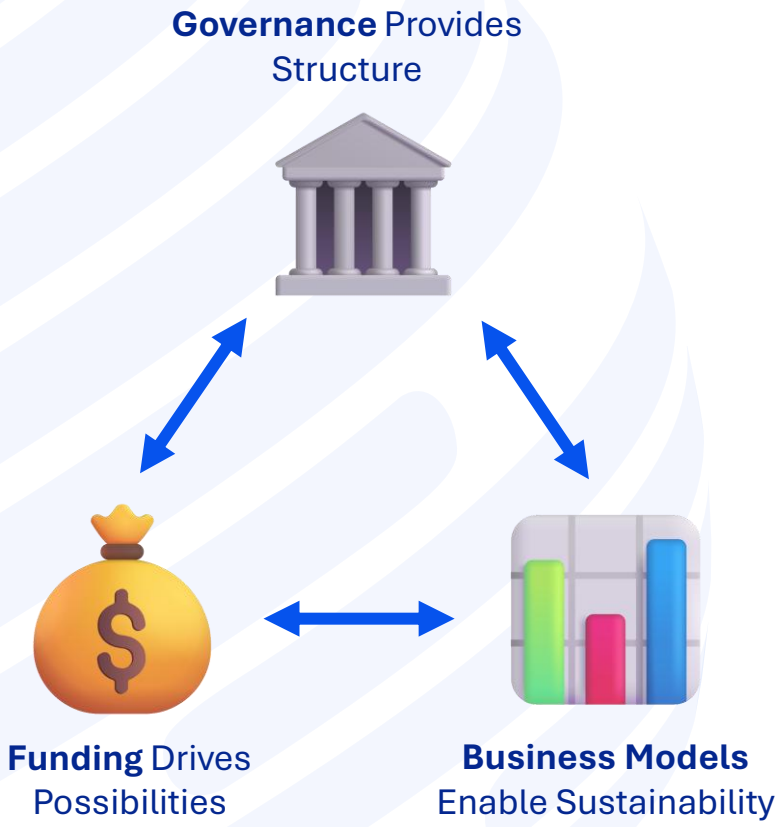
Why Governance, Business, and Funding Models of FTBs Matter ? Aim of the Present Research

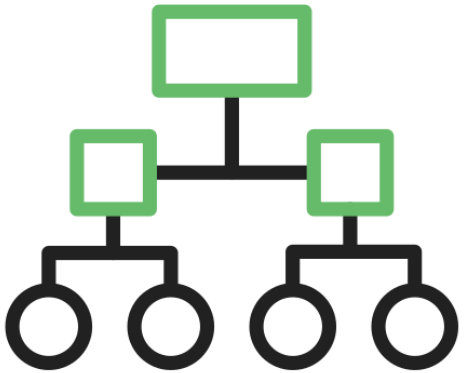
- Understand how governance structures shape complex aerospace projects.
- Explore funding strategies that enable high-risk, innovative technologies.
- Analyze business and governance approaches for multi-partner collaboration.
- Study risk management, decision-making, and intellectual property frameworks.
- Identify best practices in governance, business, and funding to accelerate development and ensure accountability.
- Support roadmaps and exploitation strategies for FTBs within EXAELIA



Methodology & Scope

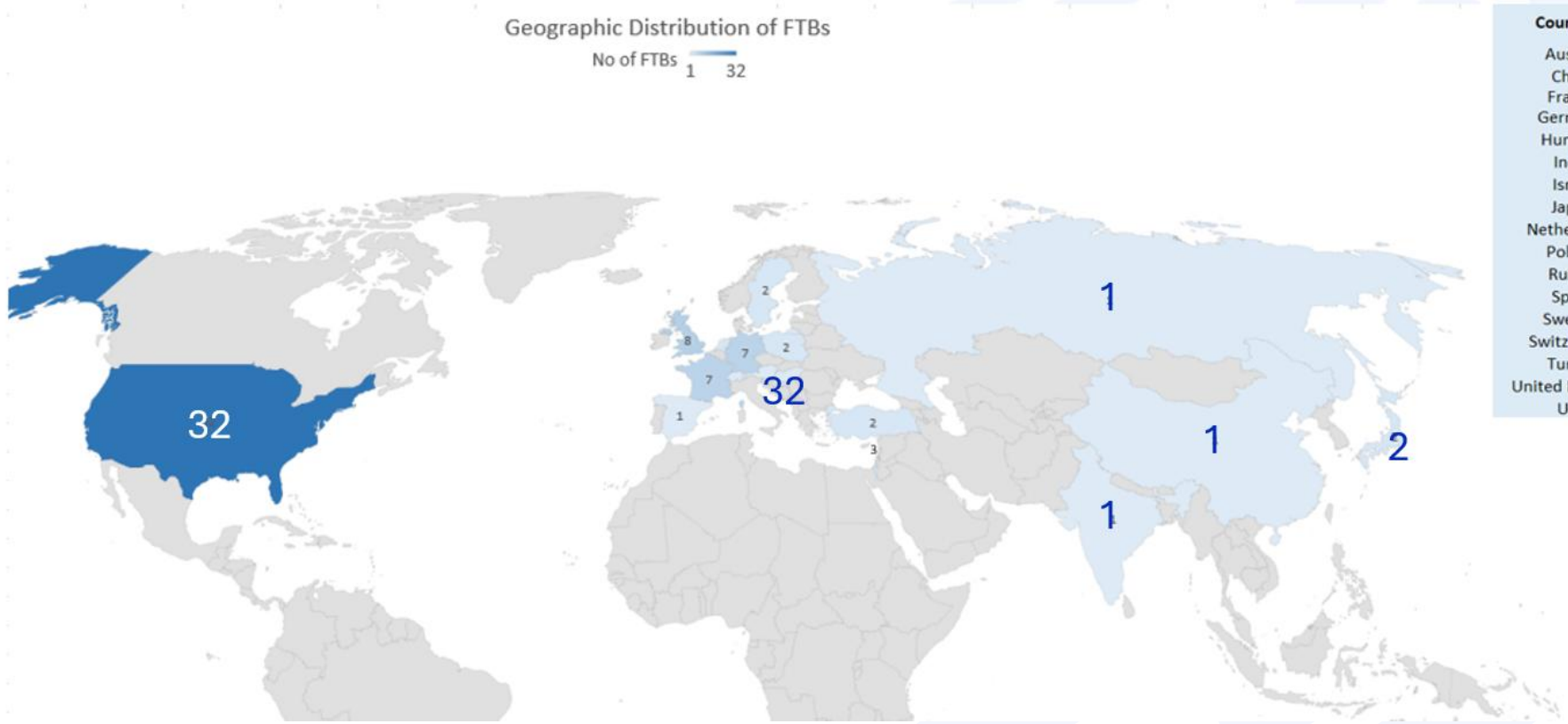
Research Methods	• Desk Research • Literature Review • Case Study Analysis • Internal Partners Insights
Data Sources (>420)	• Scientific Literature • Public Reports • Websites • Internal Partner Input • Case study and Project-specific Documentation
Analytical Framework	• Categorization based on governance, funding, and business models • Also considered contextual factors (e.g. Ownership, Sectoral Domain, Involved Actors, Lessons Learned, etc.) that may influence these dimensions
Geographic Scope	• Europe (mainly) and Worldwide (international)
Temporal Scope	• Past and Existing FTBs
Platform Types	• Manned and Unmanned Vehicles
Application Scope	• Civil and Defence sectors
Number of FTBs identified	• 74
Limitations	• Limited access to proprietary business data • Regional bias towards EU and English language sources

Categorization of FTBs



Main Criteria	Governance Models	Corporate Governance
		Public-Private Partnership
		Collaborative Consortium Governance
		Academic Governance
		Public governance
	Funding Models	Public funding
		Public-Private funding
		Private funding
	Business Models	Academic Research and Education
		Technology Demonstration & Strategic Innovation Business Model
		Commercialisation focused
Additional Factors Considered	• Country of Origin • Key Technologies • Scale • Launch Year • End of Operations (if applicable) • Main Organizations Involved • Manned/Unmanned • Civil/Defence/Dual Use • Lessons Learned • Any other noteworthy comments/facts	

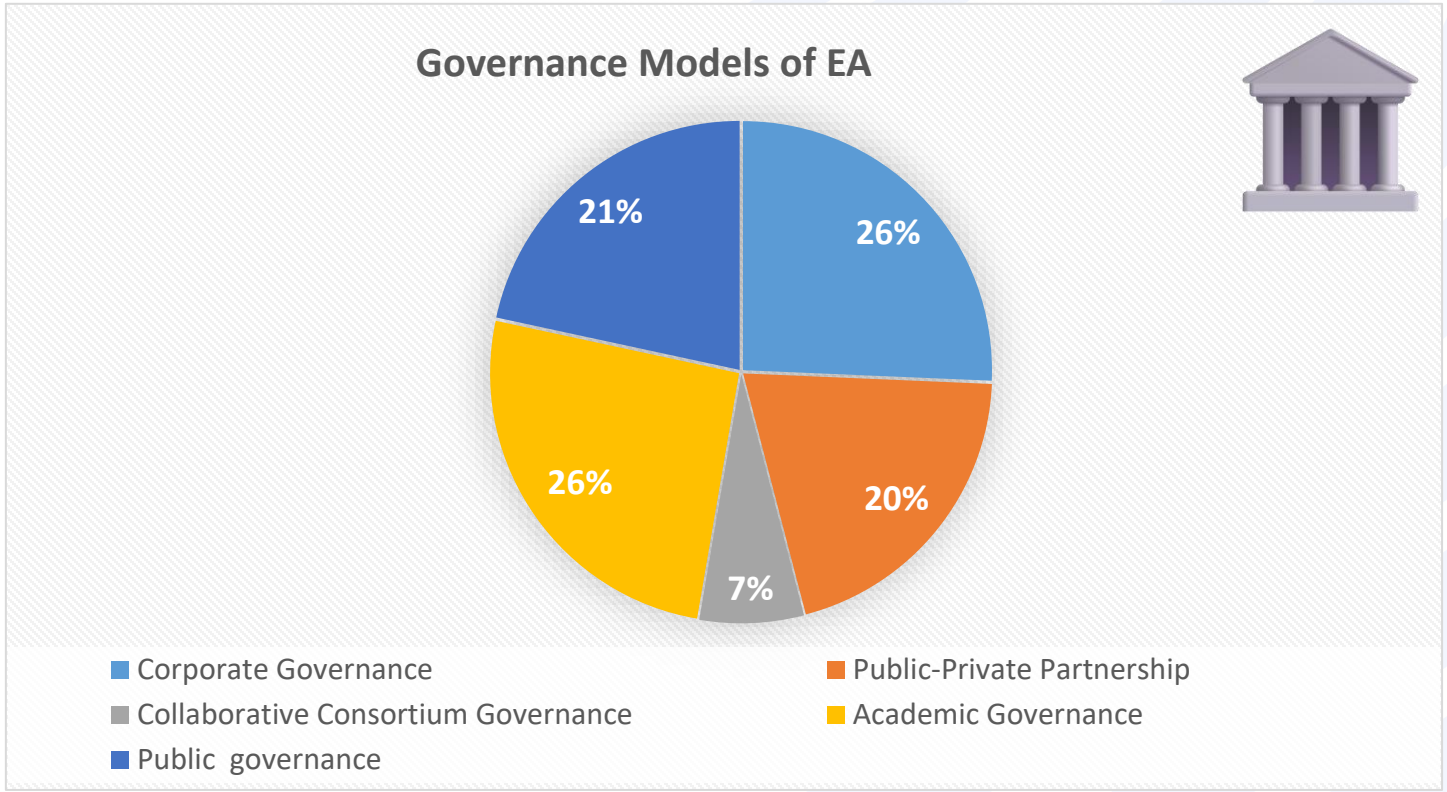
Geographic Distribution of EA



Countries	FTBs No
Austria	1
China	1
France	7
Germany	7
Hungary	1
India	1
Israel	3
Japan	2
Netherlands	2
Poland	2
Russia	1
Spain	1
Sweden	2
Switzerland	1
Turkey	2
United Kingdom	8
USA	32

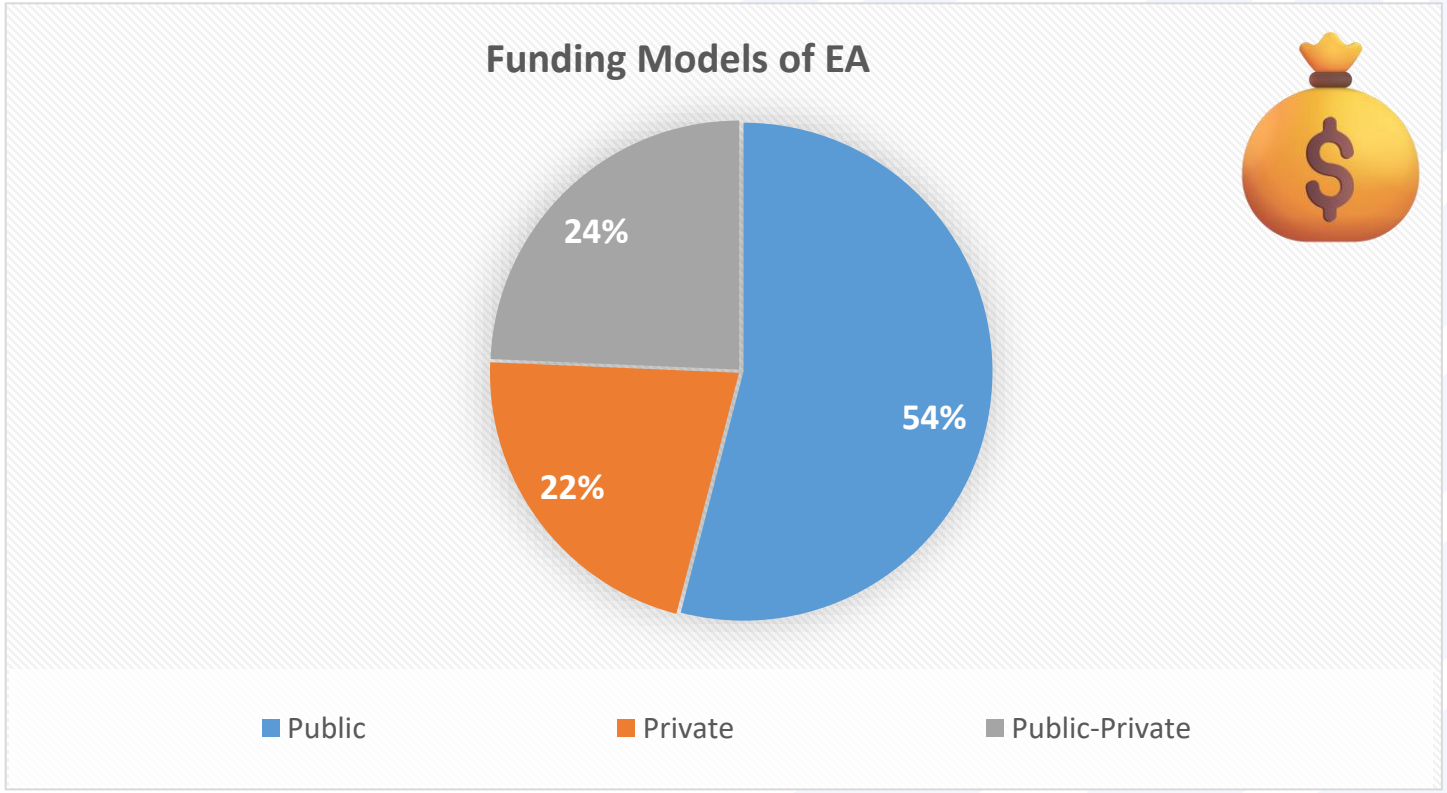
- USA is the global leader in flying testbed activity, accounting for nearly half of all identified platforms (32 out of 74), reflecting its strong investment in both civil and defence aerospace innovation.
- Europe shows a broad but fragmented distribution, with the UK, France, and Germany leading.

Overview of EA Governance Models



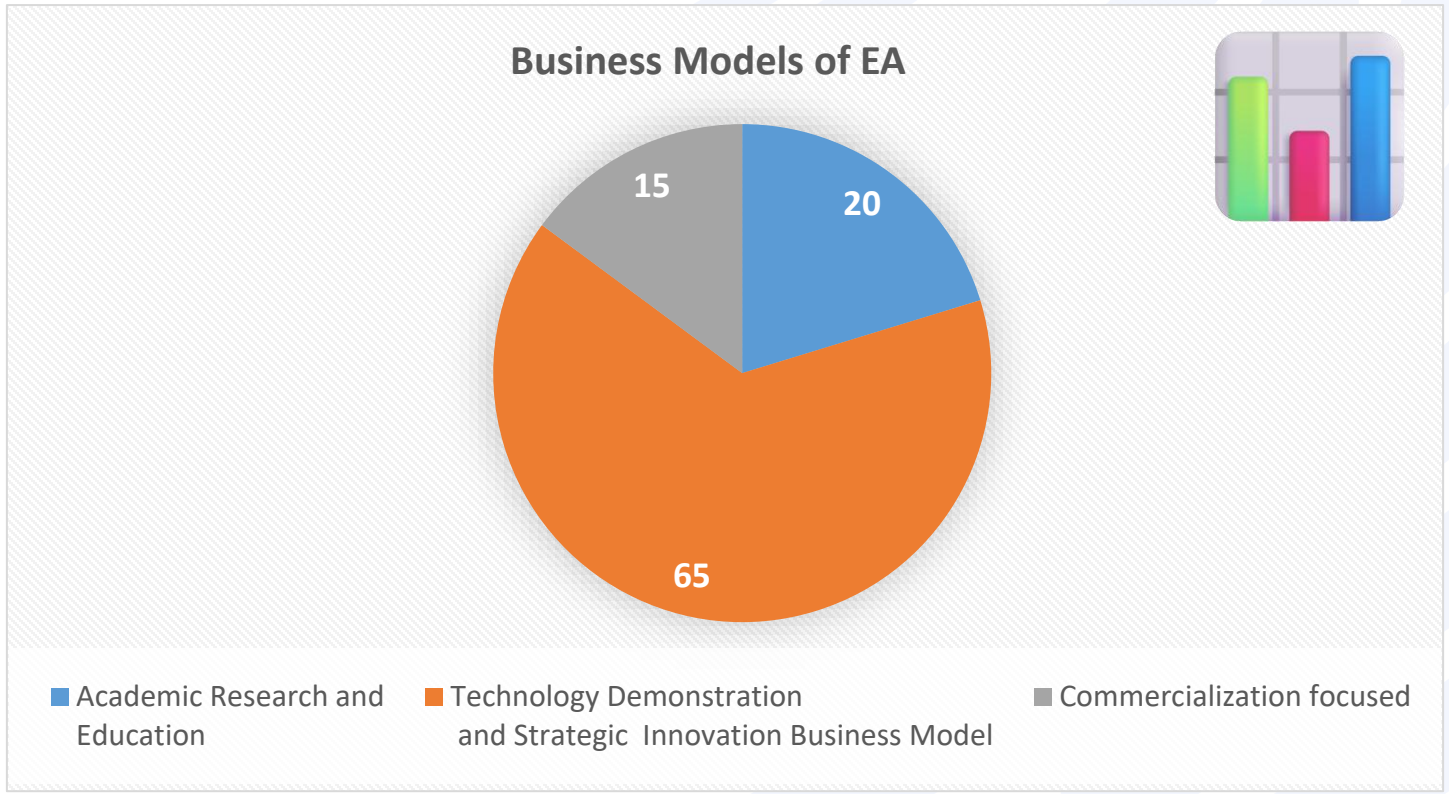
- Public-private and fully public governance together account for 41%, highlighting the importance of state involvement, often in combination with private or academic actors, especially for large-scale or strategic testbeds.
- Corporate and academic governance models are equally prominent, each representing 26% of identified EA.

Overview of EA Funding Models



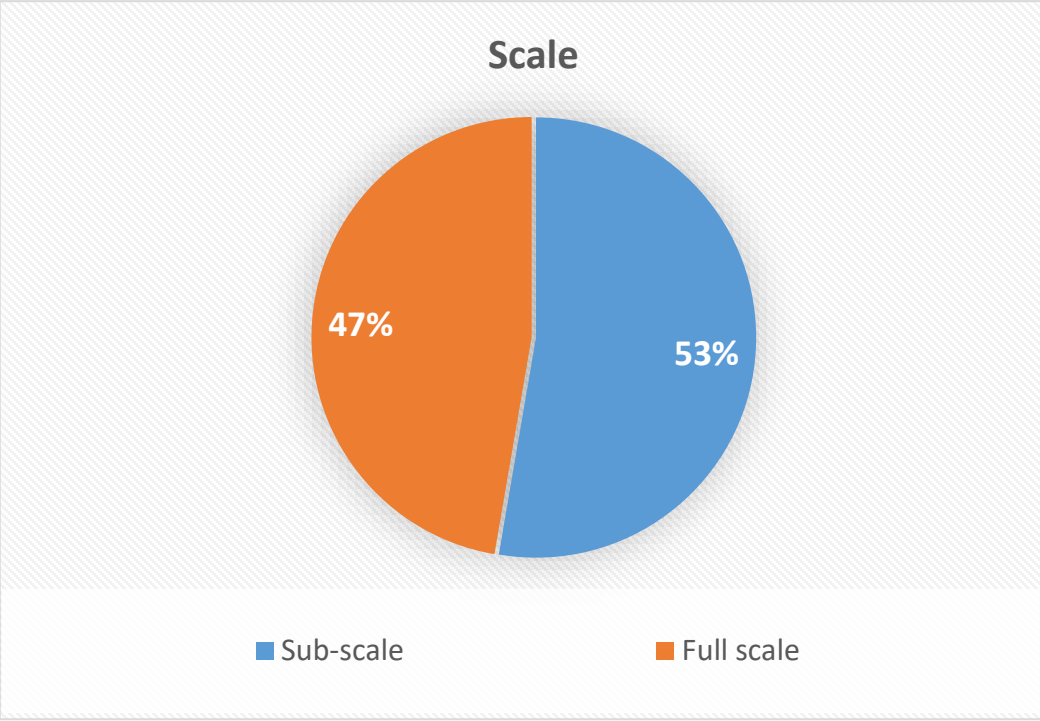
- Public funding dominates, supporting over half (54%) of the flying testbeds. This underlines the strategic and high-risk nature of such platforms, often requiring government backing for R&D, infrastructure, and regulatory support.
- Only 22% are purely privately funded, while 24% rely on mixed public-private funding.

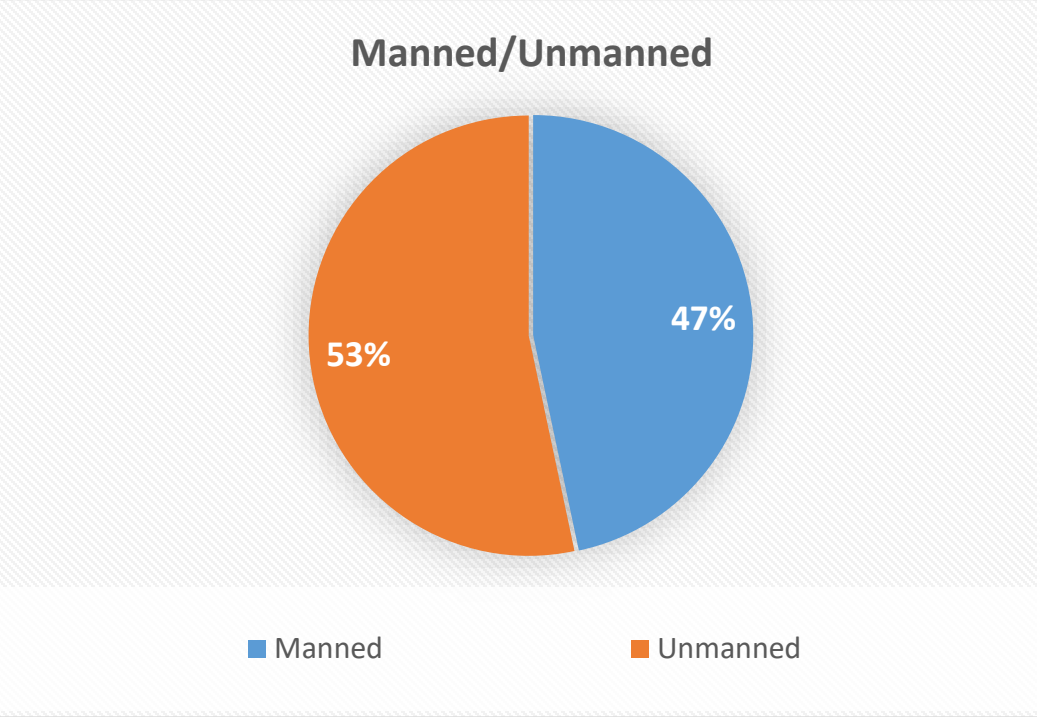
Overview of EA Business Models



- The majority of EA (65%) follow a “Technology Demonstration and Strategic Innovation” model, showing their primary role as platforms for advancing aerospace capabilities, de-risking emerging technologies, and supporting long-term industrial or defence strategies.
- Only 15% are commercialization-focused, while 20% serve academic and educational purposes, indicating that EA are rarely profit-driven and are more often positioned as strategic enablers or public-interest infrastructure.

Overview of EA Scale & Type





- The distribution between sub-scale and full-scale EA is balanced, with a slight majority (53%) being sub-scale.
- The distribution between manned and unmanned flying testbeds is almost evenly split, with a slight majority (53%) being unmanned.

Methodology & Scope

BOEING AIRBUS

NASA

HORIZON EUROPE

DEPARTMENT OF DEFENSE · UNITED STATES OF AMERICA

Aspects	USA	Europe
Dominant Governance	**Public** Governance (NASA, DoD)	**Corporate** (e.g. Airbus)
	Corporate (Boeing, Lockheed, etc.)	**Public-Private** Partnerships (EU Frameworks)
Funding	**Public** (NASA, DoD)	**Public-Private** (EU, Horizon 2020, national programs)
	Public-Private (e.g. NASA-industry)	**Corporate** Investment
Business Focus	Mixed: **Aerospace/Defence** (NASA, Lockheed) + **Commercial** eVTOL (Joby)	Predominantly **innovation-focused** within Airbus and Rolls Royce
Academic Involvement	Strong (UIUC, MIT, etc.), **many pure academic projects**	Strong but more **connected to EU consortia** or applied research

Conclusions

- EA governance balances industry, academia, and public institutions to promote collaborations.
- Public and public-private funding primarily support innovation-focused, non-commercial EA.
- Private funding drives commercialization and scaling in emerging urban air mobility markets.
- Full-scale EA are industry-government partnerships, while sub-scale ones are mainly academically led.
- Public-private partnerships enable risk-sharing and cross-sector collaboration for advanced technology development.
- Regional differences show the US leads in EA activity, with Europe fragmented but strong, and emerging markets mixing private and public funding.
- Collaborative consortia and multi-organization networks are common to effectively manage complex, high-cost testbed projects.

Limitations of the Present Research

- Work highlights past and current trends; adding future outlooks and testbeds would enrich the discussion.
- Future research should use broader, globally representative datasets, including emerging markets and non-English sources.
- Data gaps, inconsistent reporting, and transparency issues hinder financial and governance comparisons.
- Confidentiality and proprietary limits restrict access, especially for commercial and defense projects.

Thank you!

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Funded by
the European Union

under GA No. 101191922

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