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# NEXT-GENERATION SUPERSONIC FLIGHT

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PANORAMIC VIEW ANALYSIS OF START-UPS  
IN AEROSPACE AND AIR TRANSPORTATION



Supersonic passenger transport came to a close with the official retirement of the Concorde 15 years ago, but with recent advancements in composite structures, reduction of engines noise levels, and increased fuel efficiency, achieving a flight time of just 3 hours and 15 minutes between New York and London should soon be possible once again. With Lockheed Martin partnering with Aerion to develop smaller supersonic business jets and Spike Aerospace taking aim at the ultra-rich with their private jets expected to travel at Mach 1.6 speeds, the next supersonic flights are expected to take off by the mid-2020s.

Boom Technology – a startup founded out of Denver, Colorado – is a rising star in the field of next generation supersonic passenger jets, and has gained significant traction and funding in the development of its planned 55-seat all business class jet. With engineering work on SpaceX Falcon 9, the wing structure of the Airbus A380, and design of internal and external aerodynamics of hypersonic vehicles<sup>1</sup> on their resume, its no wonder they gained the attention of, and investments from, Japan Airlines (JAL), Virgin Group, and several venture capital firms.

To understand the positioning of Boom Technology – which has so far garnered around \$50M in funding – and gain insight into how other startups and players fit into the advancement of supersonic flight, taking a look at a panoramic view analysis of all companies categorized in Aerospace and Air Transportation from Crunchbase<sup>1</sup> is a great way to start.

After collecting global data on 2,275 companies including a description of their business, list of investors, number of funding rounds, total funding amount in USD, founders and core team members, number of employees and more, it was run through the [Valuenex Radar](#) platform for analysis. With proprietary algorithms incorporating unsupervised machine learning, high-dimensional visualizations and precision vectoring, the output allowed for

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<sup>1</sup> Crunchbase is a 'Master database for companies' and is the leading platform to discover innovative newcomers, the technology behind them, and all available funding details.

easy-viewing of the 2,275 companies individually plotted on the radar based on semantic similarities of their descriptions, precisely positioned on a single map. With the scale of distance representing the difference of business fields, and contour lines carving out levels of business-domain density, we could quickly gain insight of the targeted categories of aerospace and air transportation.

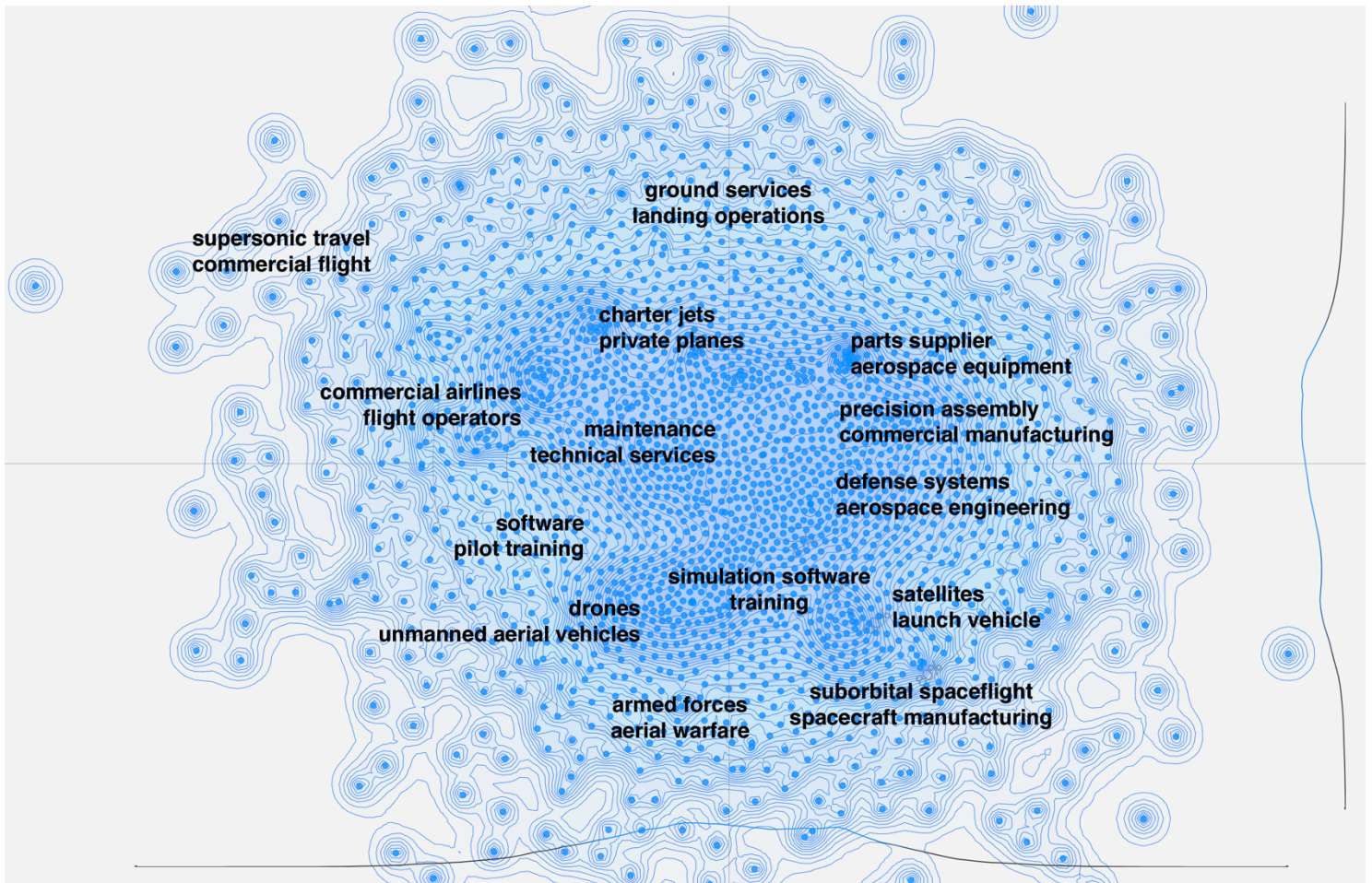


Figure 1 • Radar of 2,275 companies in aerospace and air transportation

Taking a look at the big picture as a starting point, clearly there are several high density regions, meaning there are many companies in these fields and likely in a competitive environment.

- part supplier | aerospace equipment
- charter jets | private planes
- commercial airlines | flight operators
- precision assembly | commercial manufacturing
- defense systems | aerospace engineering
- satellites | launch vehicles

It is also clear that there are a few white spaces (low density areas) encompassed within high density areas, in the fields of software and pilot training. White spaces can mean there is some gap within the field because no companies have the expertise to develop that area, no one has realized this void in the market, or the limited companies within the space can be seen as a ‘connector’ to bring together business needs from companies that surround it. Seeing as how the two main white spaces are related to software and training which fall between commercial airlines and spacecraft manufacturing, the latter seems to be the most likely, with Flight Safety International, Air Navigation, and Blue Ridge Simulation being some of the companies that fall within.

Taking a look at the regions the top three investors are putting their money in (Fig.2 - 4), we can see that the European Commission and Innovation – with its €110 billion European Structural and Investments Fund<sup>ii</sup> – has a lot of funding going into defense, satellites, space flight, and software, but nothing on the commercial air travel regions.

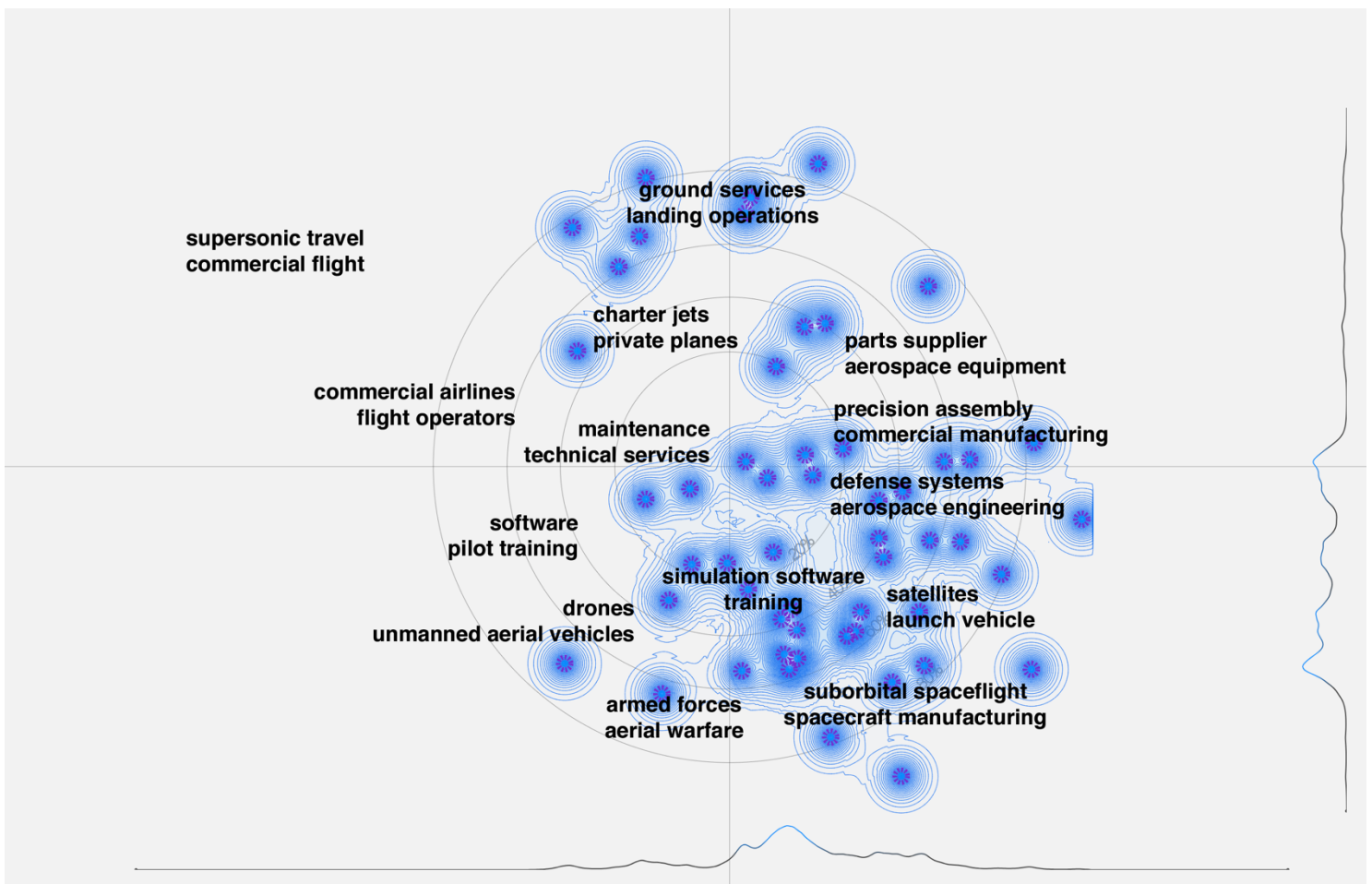


Figure 2 • Funding Areas of the European Commission and Innovation

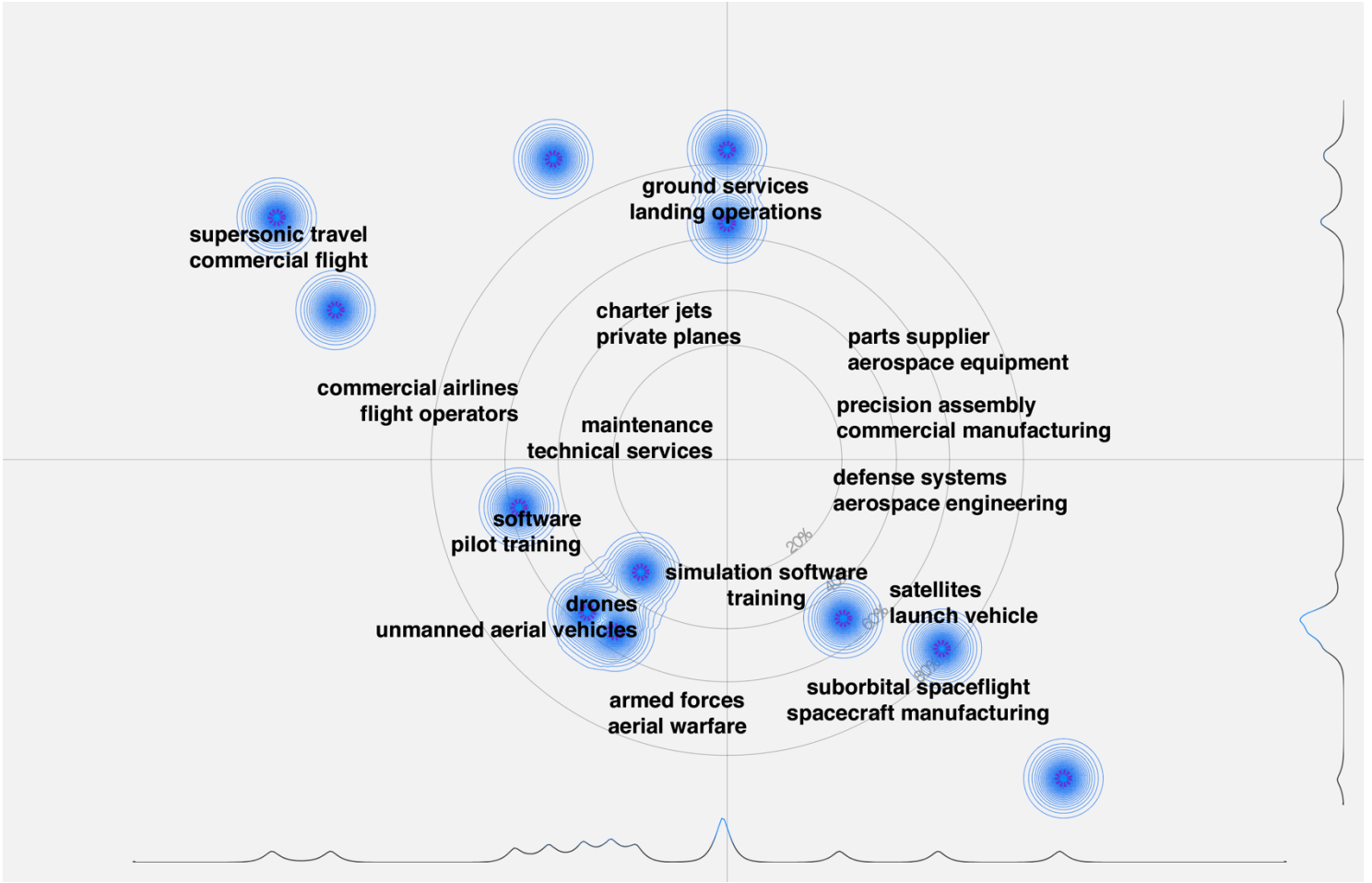


Figure 3 • Funding Areas of Y Combinator

Y Combinator has a \$700M fund with 1,672 investments, two of which went to Boom Technology, and the first being Boom’s initial seed round of \$120,000 back in 2015. Y Combinator has also funded several startups in UAV, spaceflight, and ground service areas.

53	European Commission & Innovation	4	Business Growth Fund
12	Y Combinator	4	Qualcomm
11	Dylan Taylor	4	Intel Capital
7	Space Angels	4	Lux Capital
6	Data Collective	4	Ruvento
6	RRE Ventures	4	AME Cloud Ventures
5	NYSERDA	4	Techstars
5	Shasta Ventures	4	Airbus Ventures
5	Draper Associates	4	Boost VC
5	Crowdcube	4	Alumni Ventures Group

Table 1 • Top 20 Investors in Aerospace and Air Transportation

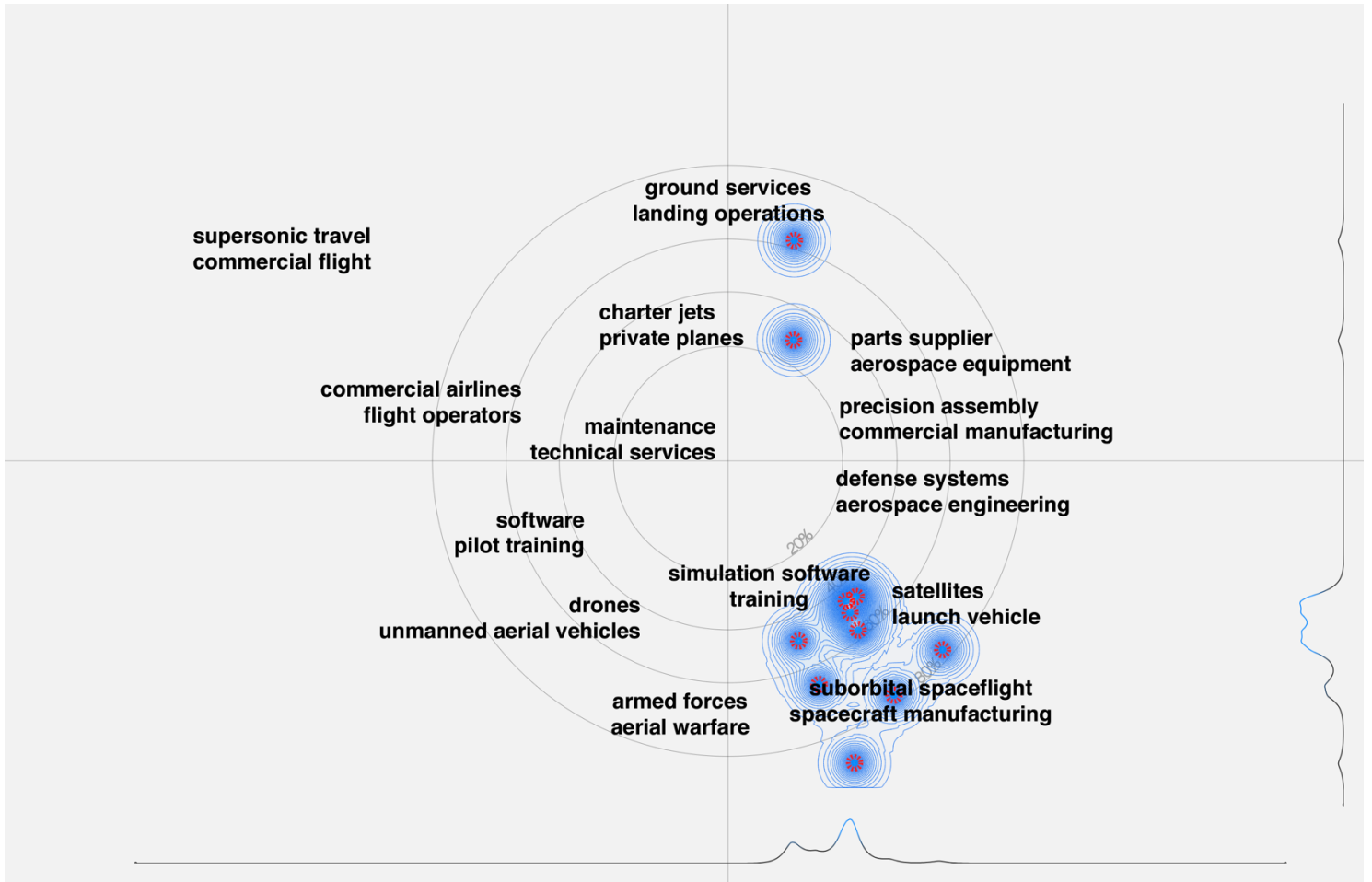


Figure 4 • Funding Areas of Dylan Taylor

Dylan Taylor – also a founding partner at Space Angels – has put the bulk of their investments into satellites and suborbital space flight.



Taking a quick look at the top 3 countries with the most companies in aerospace and air transportation, the 1,085 in the USA make it by far the country with the most firms covering most areas of the radar, with high density in the aerospace equipment, defense systems, and private planes regions. The sheer size of the US market, military related spending, and history of innovation in aerospace and air transport have certainly pushed companies to enter nearly every area currently known (Fig.5).

<b>1,085</b>	United States	<b>34</b>	Israel
<b>190</b>	United Kingdom	<b>31</b>	Italy
<b>99</b>	France	<b>28</b>	Ireland
<b>80</b>	Canada	<b>25</b>	China
<b>54</b>	Germany	<b>20</b>	Sweden
<b>54</b>	Spain	<b>18</b>	Brazil
<b>48</b>	Switzerland	<b>18</b>	Singapore
<b>42</b>	Australia	<b>14</b>	Belgium
<b>42</b>	India	<b>14</b>	Japan
<b>38</b>	The Netherlands	<b>12</b>	South Africa

Table 2 • Top 20 Countries with the most companies in Aerospace and Air Transportation

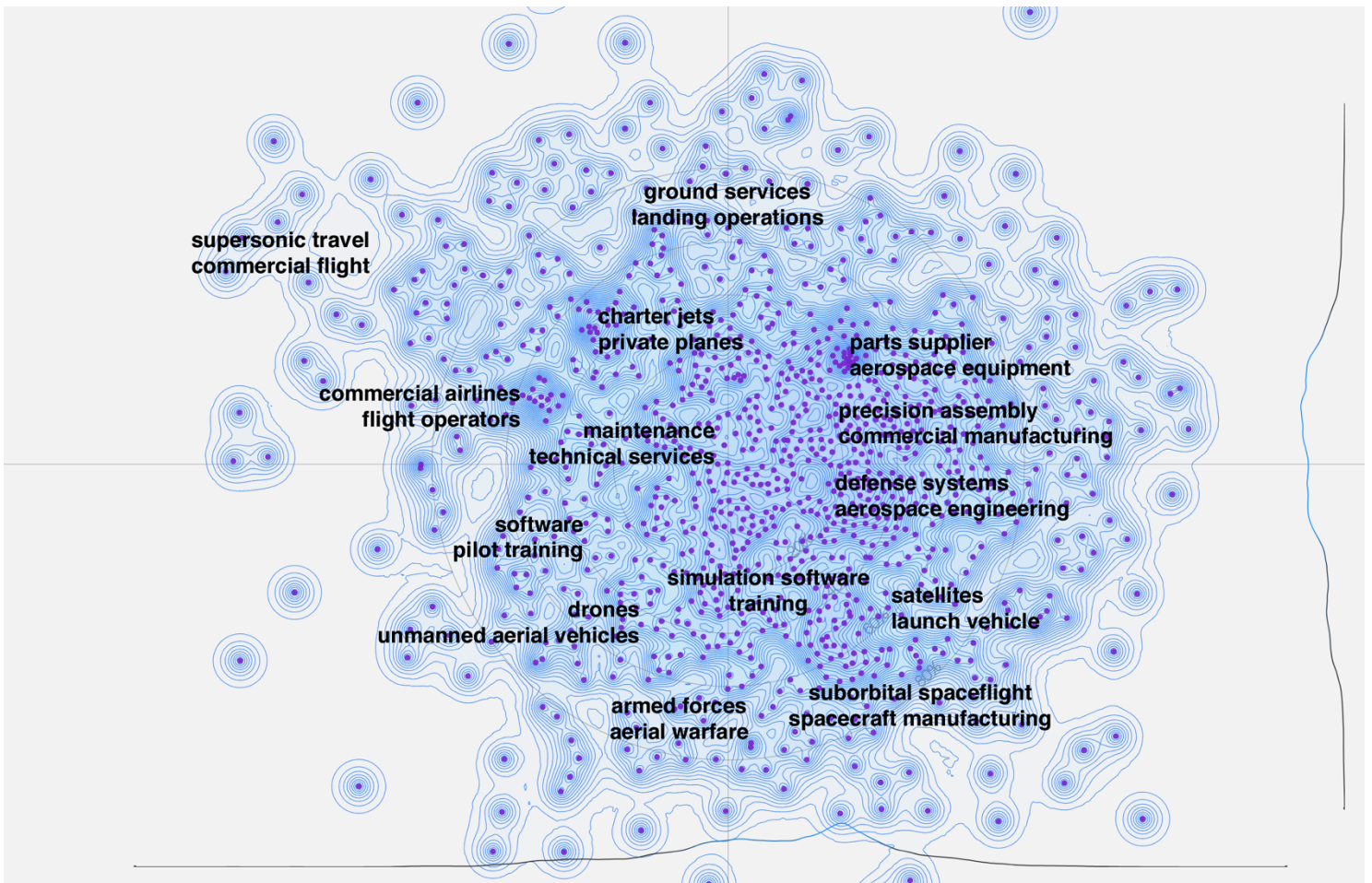


Figure 5 • US companies in Aerospace and Air Transportation

The United Kingdom, home of the multinational defense, security and aerospace company BAE Systems, as well as Rolls Royce, GKN and several other major companies in the field, also has broad coverage but seems to be lacking in the software and pilot training fields, and has nothing in or near the supersonic travel region. As the UK is the 4<sup>th</sup> largest aerospace industry in the world employing 84,000 people, it is a bit of a surprise to see the vast gaps in their home market (Fig.6).

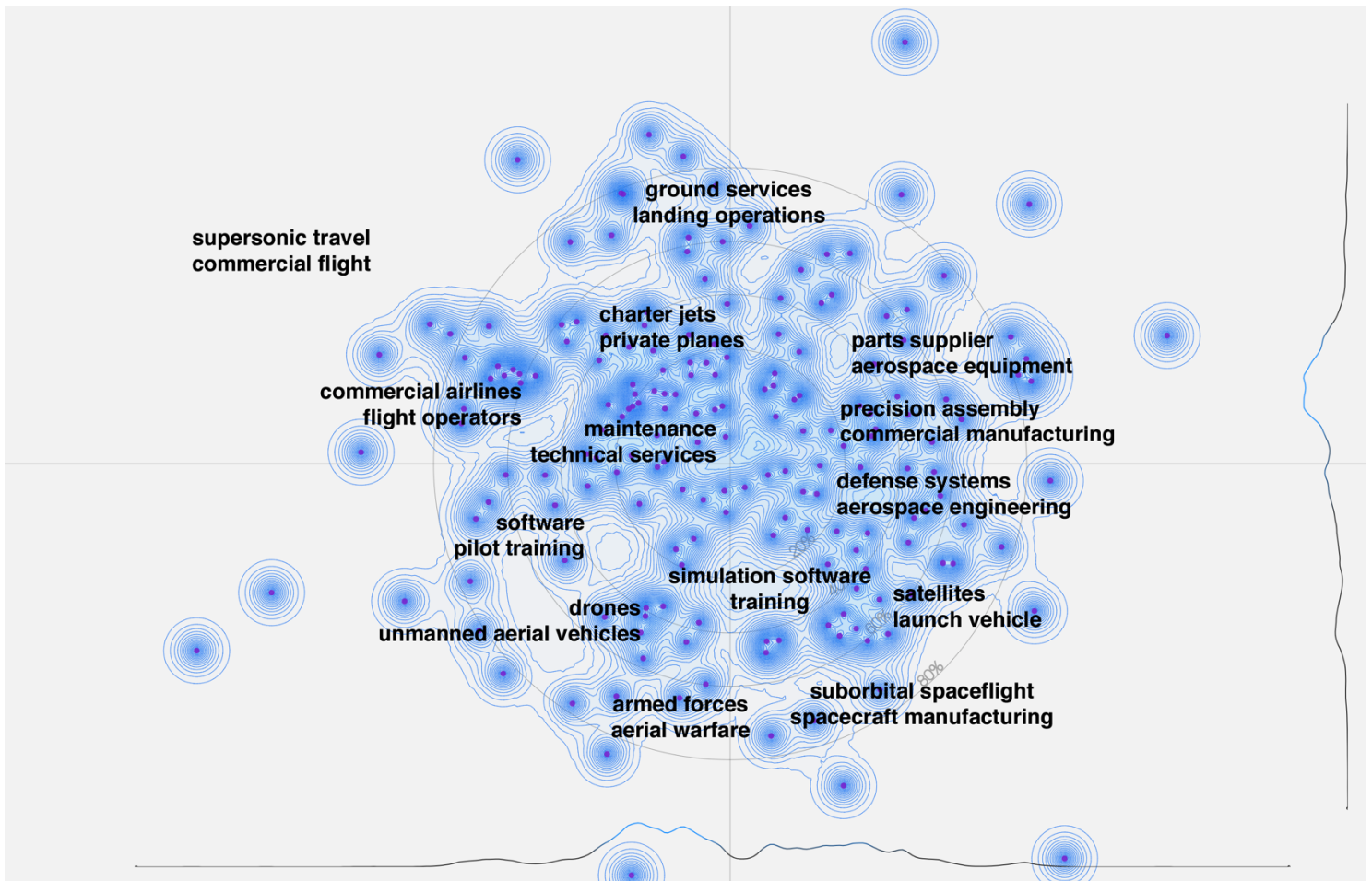


Figure 6 • UK companies in Aerospace and Air Transportation

France, while similar to the UK with the limited amount of companies in the software and pilot training regions, does have a high density of firms in the parts supplier, commercial manufacturing, and aerospace engineering fields. With the famed Aerospace Valley in the southwest region of the country being home to Airbus and Air France among hundreds of other affiliated companies employing some 120,000 workers and 8,000 researchers, they can certainly be considered a major contributor to the global industry (Fig.7).



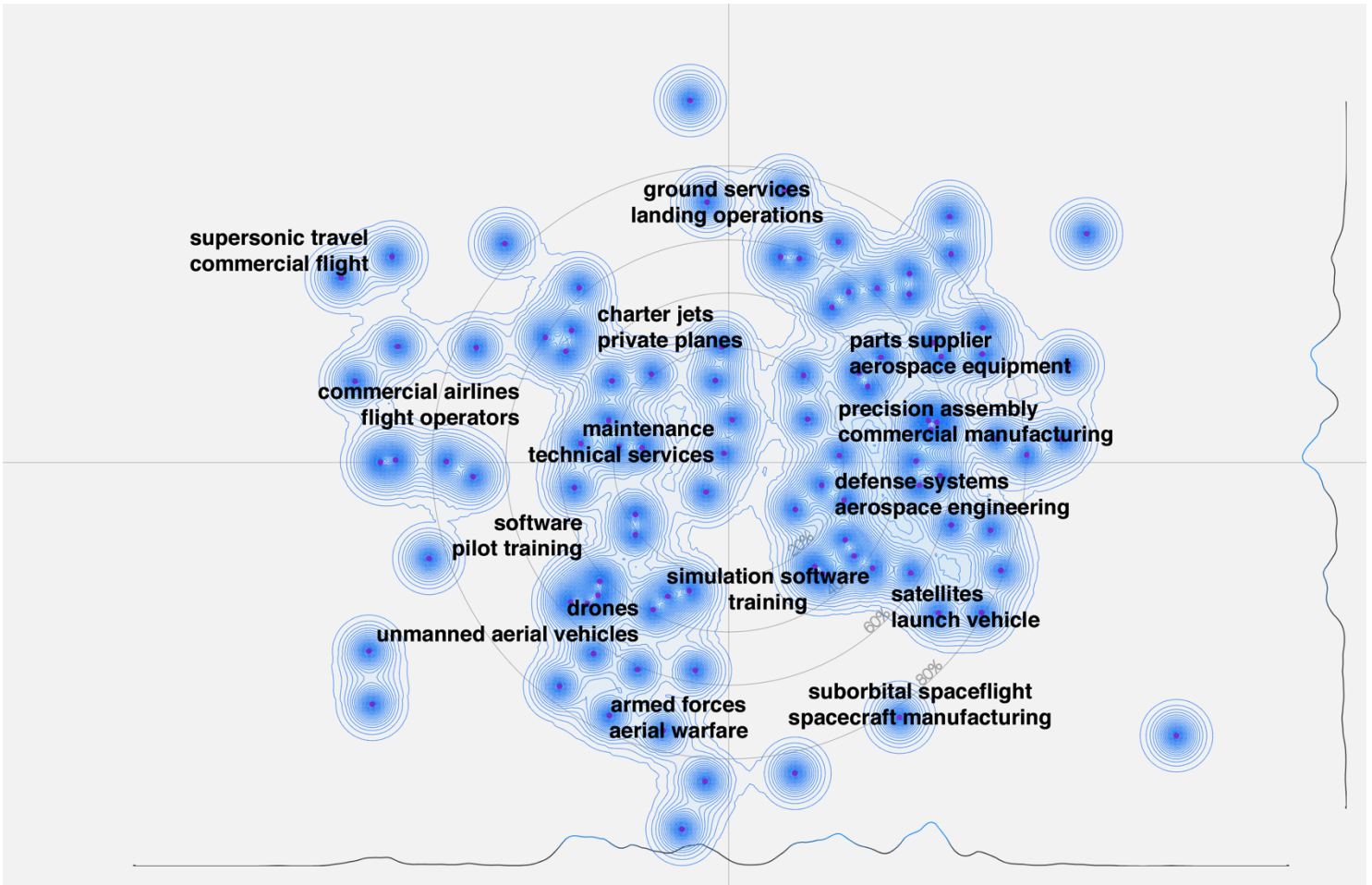


Figure 7 • French companies in Aerospace and Air Transportation

For a brief comparison of a few major Asian economies, Japan is mostly empty with no clear core areas, India is active in the software space and filling in the commercial airlines space, and China has significant coverage in the drone and simulation software fields (Fig.8).

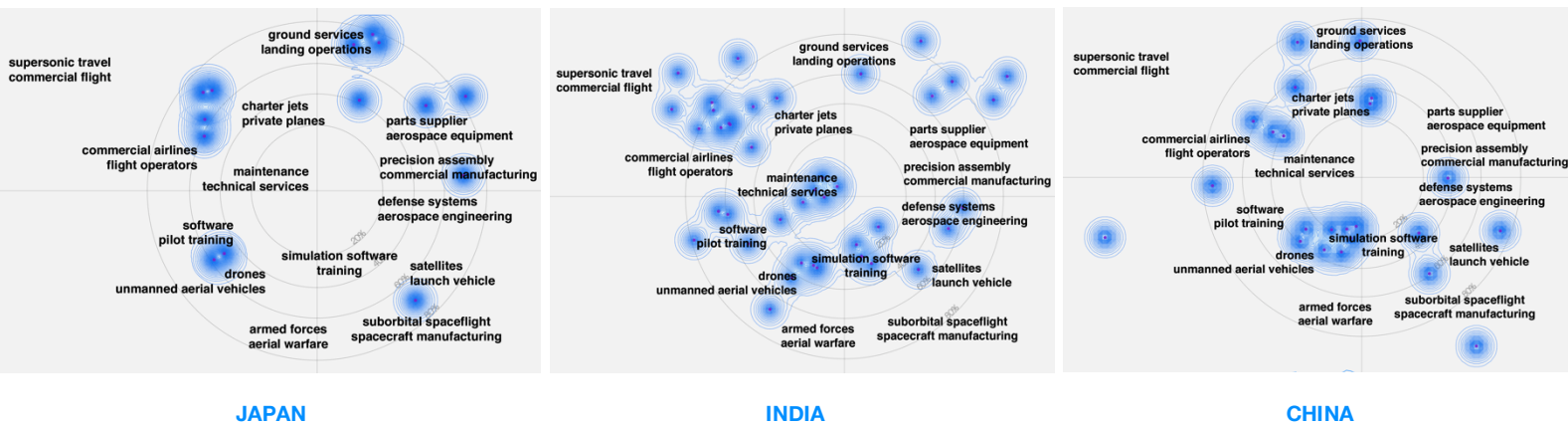


Figure 8 • Companies in Aerospace and Air Transportation in 3 major Asian economies

Now turning towards Boom Technology, the \$10M investment from JAL in December 2017 put them comfortably above the threshold needed to build the XB-1 “Baby Boom” demonstrator jet, with test flights expected to start later this year. The investment was also a show of confidence from the company known for putting money towards what it sees as the way of the future – an example being their large order of the 787 Dreamliners back in 2004 – and also its desire to realize a flight time of 5 and half hours between Tokyo and San Francisco, which currently stands at 11 hours. The \$10M investment from JAL and an earlier \$33M from 8VC puts them as largest lead investors, with 16 other entities making up the remainder.

While a total of around \$50M is relatively small compared to the deep pockets of Boeing, Airbus, and United Technologies who are also in the field, Boom Technology is positioned far away from them and most other well-known players on the radar, clearly indicating a unique approach compared to most (Fig.9). And even though British Airways and Air France (now Air France KLM) were the two airlines flying the Concorde, they are now comfortably positioned in the commercial airlines region, which is filled with several legacy airlines involved in standard passenger air transportation, including Boom’s early investor Virgin Airways.

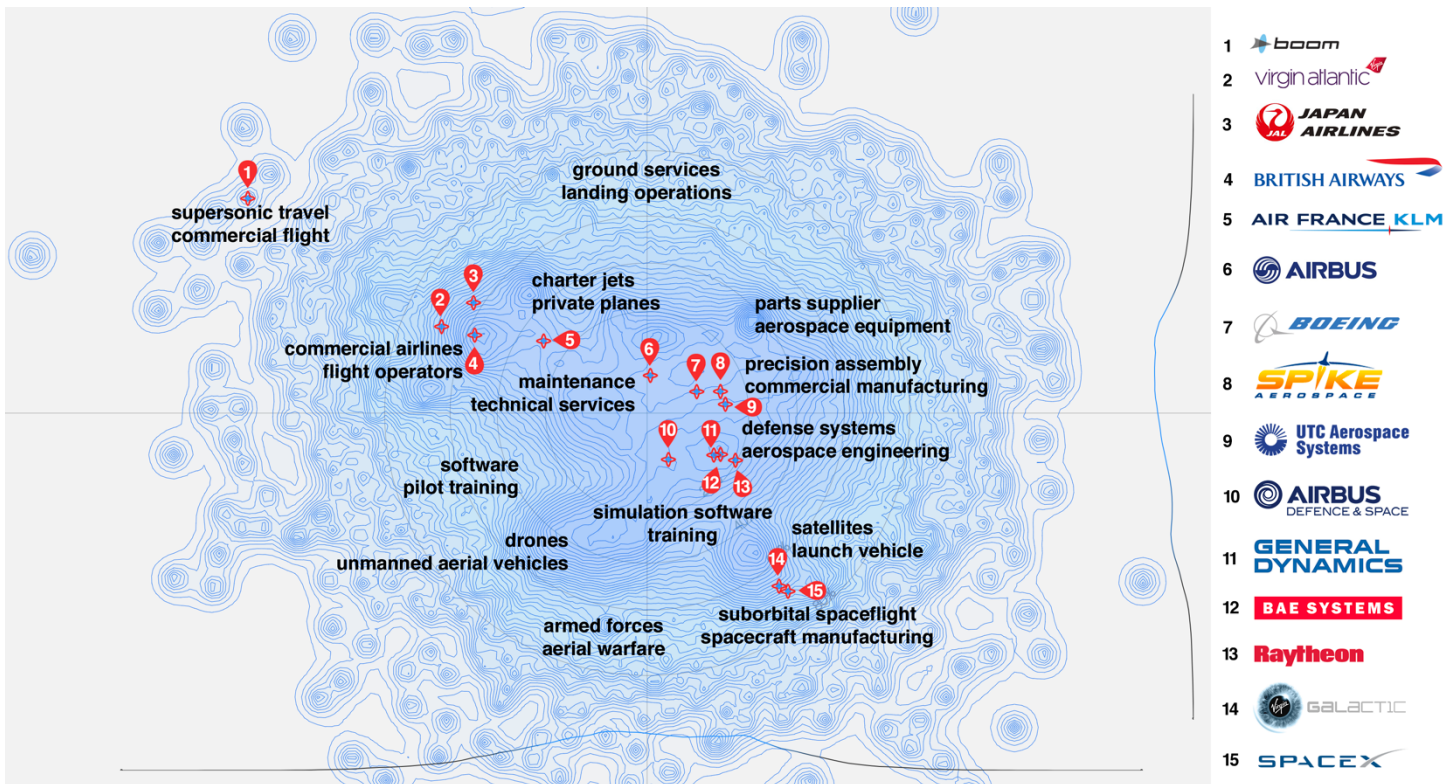


Figure 9 • Boom Technology's unique position

Spike Aerospace, labeled as one of Boom Technology's biggest competitors and considered the likely one to reach next generation supersonic flight first, is positioned in the precision assembly and aerospace engineering regions right between Boeing and UTC Aerospace Systems. Even though Spike and Boom are the only two in the analysis that are directly related to supersonic passenger flight, the degree of distance between them once again indicates that Boom Technology is paving a way of its own, while Spike, even though they are making breakthroughs in sonic-boom minimization, seems to be taking a more traditional approach to its design, development, and manufacturing.

Another indicator of Boom's uniqueness is how they are on the opposite end of the radar compared to SpaceX and Virgin Galactic, as both of these companies have engineering, manufacturing services, and flight test support flowing between them and Boom. But being connected on one level doesn't mean they should fall within the same clique, and clearly Boom's positioning shows its core aim and trajectory are in a different direction.

## Boom Airliner

### Technical specifications

#### Aerodynamics

Chine, refined ogival delta wing with swept trailing edge

#### Balanced Field Length

10,000 ft [3,048 m]

#### Powerplant

3x non-afterburning, medium-bypass turbofan; proprietary variable geometry intake and exhaust

#### Long-Range Cruise

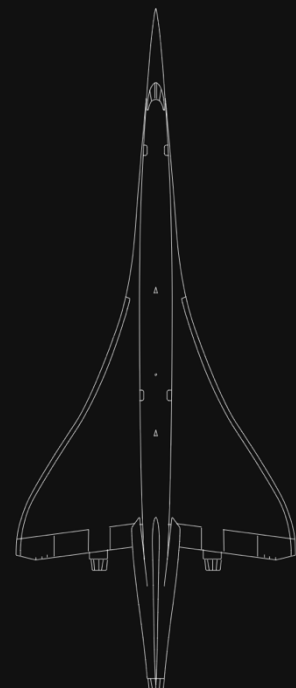
Mach 2.2  
[1,451 mph, 2,335 km/h]

#### Maximum Design Route

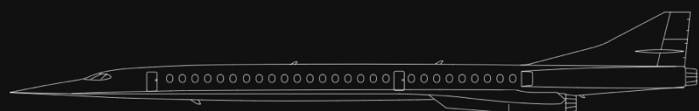
9,000nm [4,500nm unrefueled]

#### Operation

Passengers: 55 standard  
Crew: 2 pilots, up to 4 cabin crew  
Lavatories: 2



Wingspan: 60'



Length: 170'

With the panoramic analysis showing us what the key areas and companies are in aerospace and air transportation, where the funding is going, and what regions major economies are focusing on, we have learned that the future of supersonic flight seems to lie in the hands of a few new-comers backed by mature companies, venture capital, and raw ingenuity. Whether Boom Technology's unique emplacement puts it in an advantageous position, the alliance with Lockheed Martin pushes Aerion ahead, or Spike Aerospace's precision engineering approach pays out the fastest, the option to catch a flight to a destination anywhere in the world in half the time of what it takes now should become a reality by the mid-2020s at the latest.

The next question is, when this feat is achieved, will market demand be high enough for other startups to jump into the space? Who would be the key investors and in the core development teams? And, if mature companies decided to enter, then what are their existing technologies that could be leveraged to boost their position in the field? Perhaps a panoramic analysis of air-transport market data and R&D-backed patent filings along with a network analysis could provide the answers, accompanied with insight into the long term future of supersonic travel.

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<sup>i</sup> <http://boomsupersonic.com/company>

<sup>ii</sup> [https://ec.europa.eu/growth/industry/innovation/funding\\_en](https://ec.europa.eu/growth/industry/innovation/funding_en)

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