

This white paper examines the current vehicle manufacturing landscape and what challenges lay ahead for companies who enter the space.

Overcoming Obstacles as an OEM

*James Ford, Director, NEXA Capital Partners, LLC
Phillip Dymont, Director, UAM Geomatics, LLC
Daniel Miller, Senior Analyst, UAM Geomatics, LLC*

Established manufacturers and startups alike are clamoring for their piece of the UAM market, racing against each other to provide commercially ready vehicles. A variety of different vehicle types and configurations will be needed to service the numerous missions that will make up the urban air mobility industry. Special considerations for vehicle weight, capacity, noise profile, propulsion type, range, and other factors will need to be weighed as operators down select platforms for their service offerings.

Uninhibited Platform Development



According to the most recent estimates by our partners at the [Vertical Flight Society](#), there are over 200 UAM vehicles in some stage of [development or testing](#). Among the companies developing UAM platforms, there are high-visibility OEMs like [Boeing](#), [Airbus](#), and [Bell](#), as well as noteworthy startups such as [Joby](#), [Lilium](#), and [Volocopter](#), who have been able to secure significant amounts of investor capital to fund their visions, all competing for slices of the same markets. In addition to those high profile vehicles, there are many, many more, fighting for relevancy

and against skepticism in the hopes that they too might enter into a partnership with an [operator](#) or [city](#) and get a leg up on the competition. Still more, there are existing helicopter manufacturers that have yet to get into the fray like [Robinson](#) or [Sikorsky](#), who stand to generate interest should they announce development of a UAM vehicle. In other words, for an industry that is yet to exist in any meaningful commercial way, it is already extremely crowded. Unfortunately for most, there will be no long tail of success or production, due to a variety of very costly and very real regulatory, manufacturing, and operational challenges.

Certification Hurdles

While not every principality has stringent [certification requirements](#) to enter into commercial operation for UAM purposes, it is generally accepted that the largest economic opportunities lay in parts of the world where vehicle certification is a must. In the U.S., the [FAA governs aircraft certification](#), and depending on the size, type, and purpose of a vehicle, that process can be [very long and very costly](#), usually in the hundreds of millions of dollars. The vehicle

certification process is a hurdle for all entrants in the space but does provide an advantage to incumbents who have familiarity with getting aircraft certified and understand the timeline to certification. Furthermore, those OEMs with established lines of business will have distinct advantages with regards to covering the [costs of certification](#), as outside revenue streams will be able to fund their efforts, as opposed to investor capital, which can dry up quickly.

Capital Needed

As mentioned, the capital needed for aircraft certification can be immense, but that only paints a portion of the picture with regards to getting a vehicle prepared for commercial operations and getting a company prepared for commercial manufacturing. [Funding is needed](#) to cover all the expenses related to research and development surrounding a vehicles entire [ecosystem](#), from [battery technology](#) and propulsion types, to [avionics](#), [cabin furnishings](#), and even interactions with vertiports. How a vehicle manufacturer approaches these items can certainly save on costs, but no area can be overlooked, and

some level of funding will be required to flesh out a commercially viable solution. We are in the midst of a strong economic cycle that supports [financial investing](#) and has allowed manufacturers to access the capital markets, but every investor expects a significant return on their investment within a reasonable time horizon, and as capital comes in companies begin to not only race against their competitors, but against the clock as well.

Right Vehicle for the Mission

Despite [on-demand mobility](#) being the most talked about use case for eVTOLs, it is likely that other use cases, or missions, will emerge as the early footprints for vehicles in the space. NEXA has identified at least 11 viable missions for which vehicles will need to be developed, including regional air mobility (RAM), emergency medical services, and airport shuttle services, with many more missions set to emerge as technology continues to develop. Each mission has [necessary vehicle specifications](#), and although some missions have overlapping vehicle requirements that can allow platforms to be utilized for multiple mission



Operator Markets for UAM
74 Cities ranked by GDP

We Analyzed Five Services...

- Airport Shuttle
- On Demand Air Taxi
- Corporate Campus/Business Aviation
- Regional (>200Mi) On Demand
- Medical/Emergency

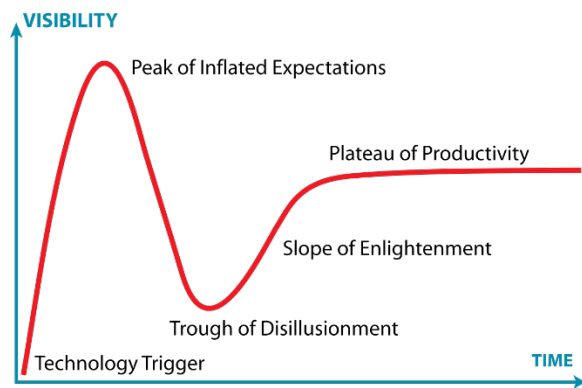
...and We Side-Stepped Six...

- UAM Markets Outside 74 Cities
- Manufacturing, Cargo, Freight
- New Business Models for Part 121 Operators
- Military Apps and Opportunities
- Recreational/Tourism
- Exotic Niches (Personal Travel, Etc.)

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types, there will likely be a high degree of [specialization for eVTOLs](#) to be built to fit a single mission over the course of their life, at least in the early stages of the industry. With vehicle specialization in mind, each mission vertical becomes more competitive for OEMs, making their vehicle's ability to capture early market share critical to their sustained success. For OEMs with outside investors, there is not a lot of room to 'swing-and-miss,' so to speak, on their vehicle design or pivot their vehicle's mission-fit after initial development.

Outlasting the Hype



There are many schools of thought around how new industries develop, and Gartner's oft cited hype cycle will likely serve as a good example for the emerging UAM market. Just as when the commercial UAS space was entering formative years between 2013-2015, with [hundreds of millions](#) of dollars sunk into companies that [ultimately went belly up](#), the UAM market, too, will experience growing pains that will reduce the number of companies from the initial entrants in the space. It is safe to say that technology triggers on multiple fronts have [enabled eVTOL development](#) and sparked the UAM revolution we are currently witnessing on multiple fronts, and the

current capital being raised and valuations of companies in the space lends to the theory that we are approaching the peak of inflated expectations. With organizations like Morgan Stanley putting [a \\$1.5 trillion price tag](#) on the UAM market, it is hard to not get excited, but inevitably, the pendulum is due to swing in the other direction. Continued [regulatory inaction](#), slower-than expected [battery advancement](#), [vehicle crashes](#) and fatalities, or general macroeconomic recession could all contribute to a violent snap back to reality, and even more unforeseen circumstances and events could accelerate entry into the 'trough of disillusionment'. Practically speaking, however, there is obvious value to what the UAM market offers; it might just be a bumpier journey than industry evangelists currently paint.

Let Us Help

There is tremendous opportunity for VTOL and eVTOL manufacturers in the UAM space, although potential future returns do not come without risk. Successful OEMs and investors currently need access to the appropriate market research and data points to make prudent decisions and avoid perilous pitfalls in their go-to-market strategy, and UAM Geomatics can help. Our work is validated by over 30 years of aerospace and business aviation expertise, having helped countless [clients large and small](#) navigate unique aviation challenges with ease. Contact us today by e-mail at daniel.miller@nexacapital.com or call us at 202-499-5070 to discuss your challenges and learn how we can help. Additionally, we will be speaking and exhibiting alongside our numerous industry partners at future industry events.