5 MUST-HAVES FOR TAKING OFF IN THE ADVANCED AIR MOBILITY MARKET

Overcome the key challenges to bring eVTOLs and UAVs to market faster

DASSAULT SYSTEMES

ADVANCED AIR MOBILITY IS TAKING OFF IN A BIG WAY.

Designers and engineers around the world are unlocking the future of flight with stronger lightweight materials, smaller mechanical assemblies, more powerful batteries, and regulations favoring a change in how we use our airspace.

"Urban air mobility has become the new frontier in aviation, driven by a desire for small, quiet and sustainable aircraft to provide mass transportation for intra-city, short-haul and regional travel,"

says Kate Sarsfield for FlightGlobal[1].

Our collective goals include more sustainable transportation options, less traffic congestion, and less noise pollution. As a result, the number of creative minds turning their energy toward UASs, eVTOLs and other aerial green vehicles is skyrocketing.

1 - Why urban air mobility projects are skyrocketing

BUT THE RUNWAY IS CROWDED.

As exciting as the opportunity may be, engineers face a dicey journey—one as risky as the experiments attempted by 19th- and 20th-century flight pioneers. (Though today it is the survival of the business on the line rather than the pilots themselves, thankfully.)

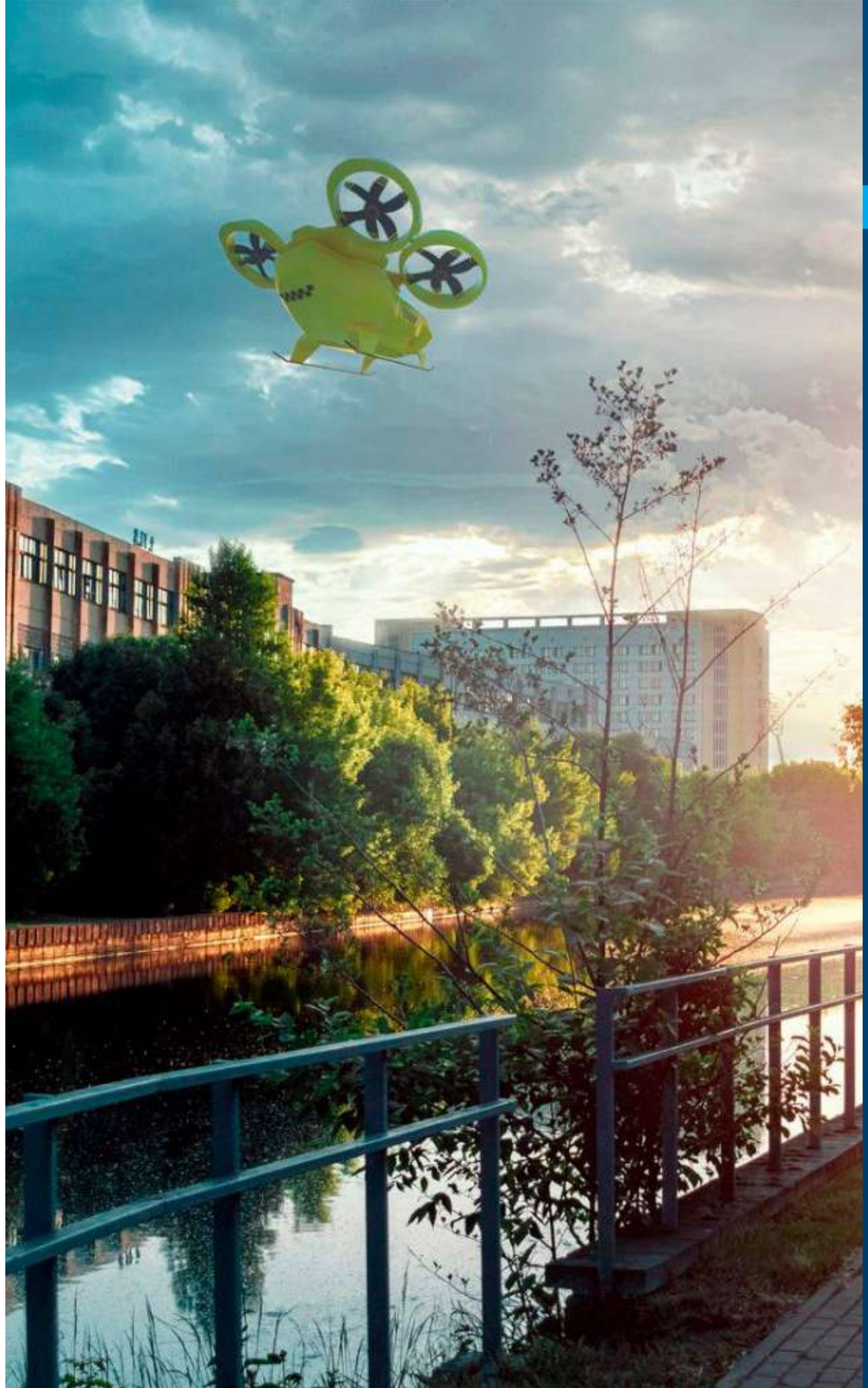
Competition is growing daily and it's tough to stand out. The World eVTOL Aircraft Directory lists at least 475+ known electric and hybrid-electric vertical takeoff and landing (eVTOL) concepts that have been developed to date.[2]

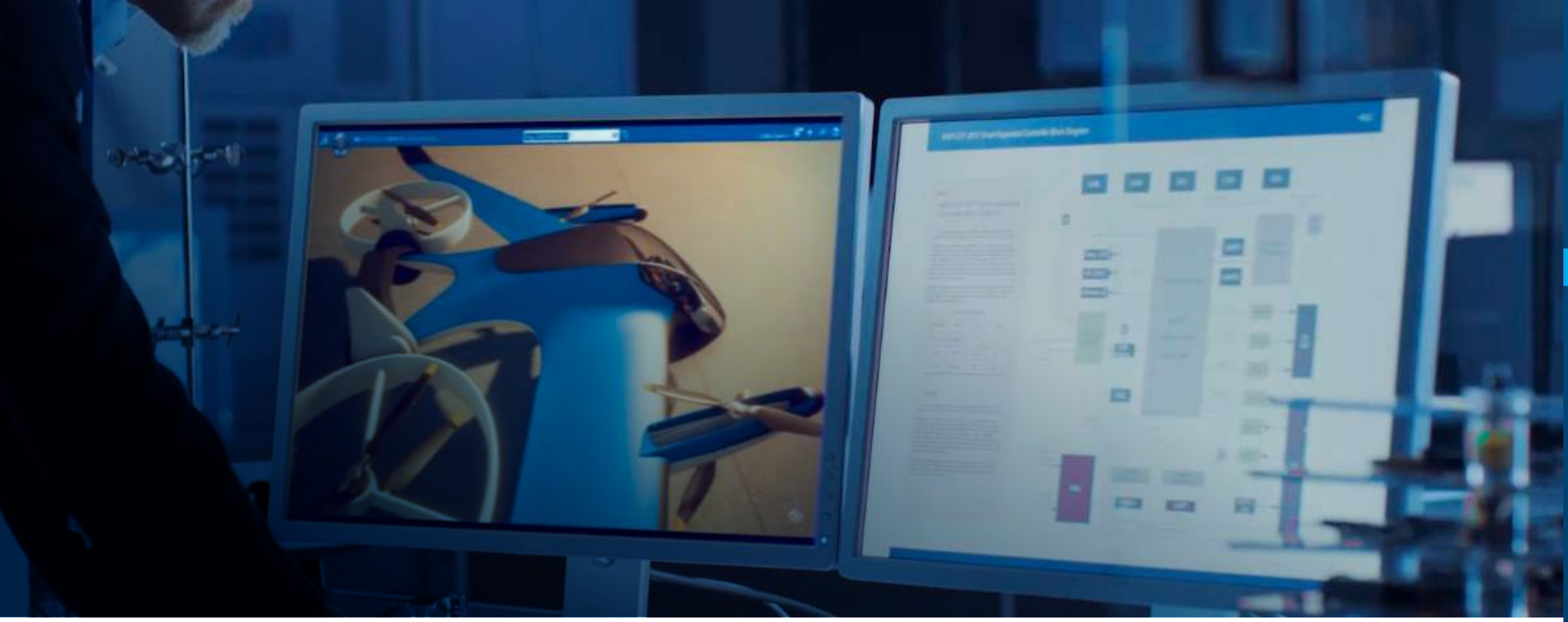
Aerospace startups and product innovation teams within established organizations are competing on creativity and speed to market. And the obstacles are daunting. Universal challenges include:

- Learning (and anticipating) as much as possible before physical prototypes are built
- Communicating and collaborating seamlessly across disciplines
- Responding with agility to market conditions and customer demands
- Selecting the right tech to match design challenges
- Laying the groundwork for a design-for-manufacturing process that scales
- Achieving compliance and industry certifications
- Persuading investors to back the project

Because of these obstacles, only a few will arrive at their final destination: a dominant position in the market.

2- Source: The Vertical Flight Society eVTOL Aircraft Directory, https://evtol.news/aircraft





PICK YOUR PLATFORM WISELY.

For design teams focused on UAVs, eVTOLs and other air mobility solutions, the project lifecycle management platform you choose is critical to the success of your vision.

This decision will determine the efficiency of your processes, the quality of your product and your ability to grow.

Your chosen system should propel your team to:

1. **Be first**
2. **Be agile**
3. **Be compliant**
4. **Be unique**
5. **Be able to scale**

The **3D**EXPERIENCE platform on the cloud is a robust, scalable solution designed to help startups and and innovative OEMs develop new mobility experiences.

It offers digital continuity and controlled execution to design teams who are taking aviation to new heights.

THE 5 KEYS TO SUCCESS IN THE ADVANCED AIR MOBILITY INDUSTRY

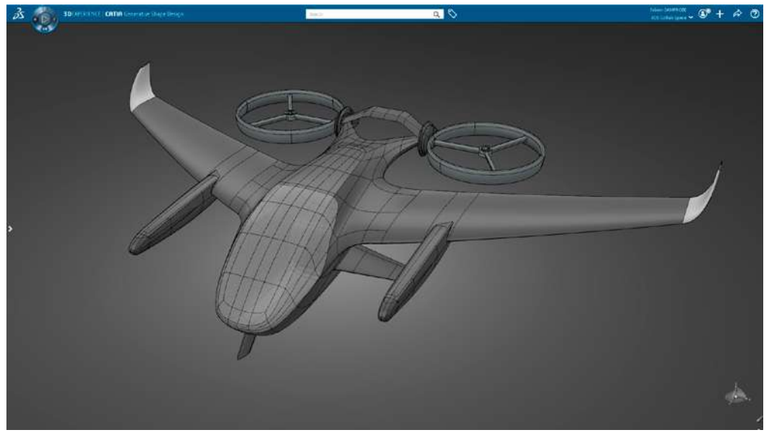
1. Be first to market.

A unified digital platform reduces rework and removes the need to convert data from system to system. Shorter release cycles allow you to reach a viable prototype faster. A turnkey engineering experience lets team members ramp up quickly. A secure, cloud-based platform enables stakeholders to collaborate productively across the value network.

Integrated modeling and simulation, known as ModSim, allows engineers to fully experience the product and its behavior in the early design phases. This means they can deliver more complex and sophisticated products while meeting performance requirements and time-to-market deadlines.

With ModSim, specialized materials, operational context and manufacturing processes are considered from the beginning. Cross-disciplinary teams collaborate and interact efficiently and iteratively to contribute their expertise to the development process.

With a system that supports an accelerated concept-to-certification process, you'll have a first-mover advantage.



RAPID EVTOL DEFINITIONS AT VERTICAL AEROSPACE

To innovate at full speed and meet ambitious targets, Vertical Aerospace leverages the **3D**EXPERIENCE platform on the cloud to define and manage eVTOLs. The engineering team accesses enterprise-level design, engineering and simulation tools through a single, secure, standards-based environment. As a result, their development workflow is seamless.

"The cloud gives our business resilience and allows us to continue working from any location at any time, having all our data reside on the cloud creates a single source of truth while saving us any upfront capital investment." [3]

Eric Samson, Head of Engineering
at Vertical Aerospace.

3 - Vertical Aerospace Defining Processes to Design Electric Aircrafts

2. Be agile in the face of uncertainty.

Agility is critical for startup success. Changing market conditions, engineering requirements, competitive pressures and many more variables in such a nascent industry demand that teams of all sizes stay nimble. That means building on processes and systems that can grow with your team to meet current and future needs.

The **3D**EXPERIENCE platform on the cloud makes it possible to deploy within hours, building scalable computing resources that don't rely on heavy IT investment. Set up and start using the platform with minimal configuration and shift resources to a rapidly scalable cloud computing infrastructure.

Reduce your IT expenditure by switching licenses on and off through the stages of your product development process. Choosing a subscription model lets you pay only for what you need, quickly adding or removing capabilities like simulation and electrical engineering.

AGILE UAS DEVELOPMENT AT GENERAL AERONAUTICS

General Aeronautics in India designs and develops unmanned aerial systems (UASs) that help tackle some of society's biggest environmental challenges. By adopting the **3D**EXPERIENCE platform on the cloud, the company has gained complete visibility over its product lifecycles and can easily optimize its next-generation drones.

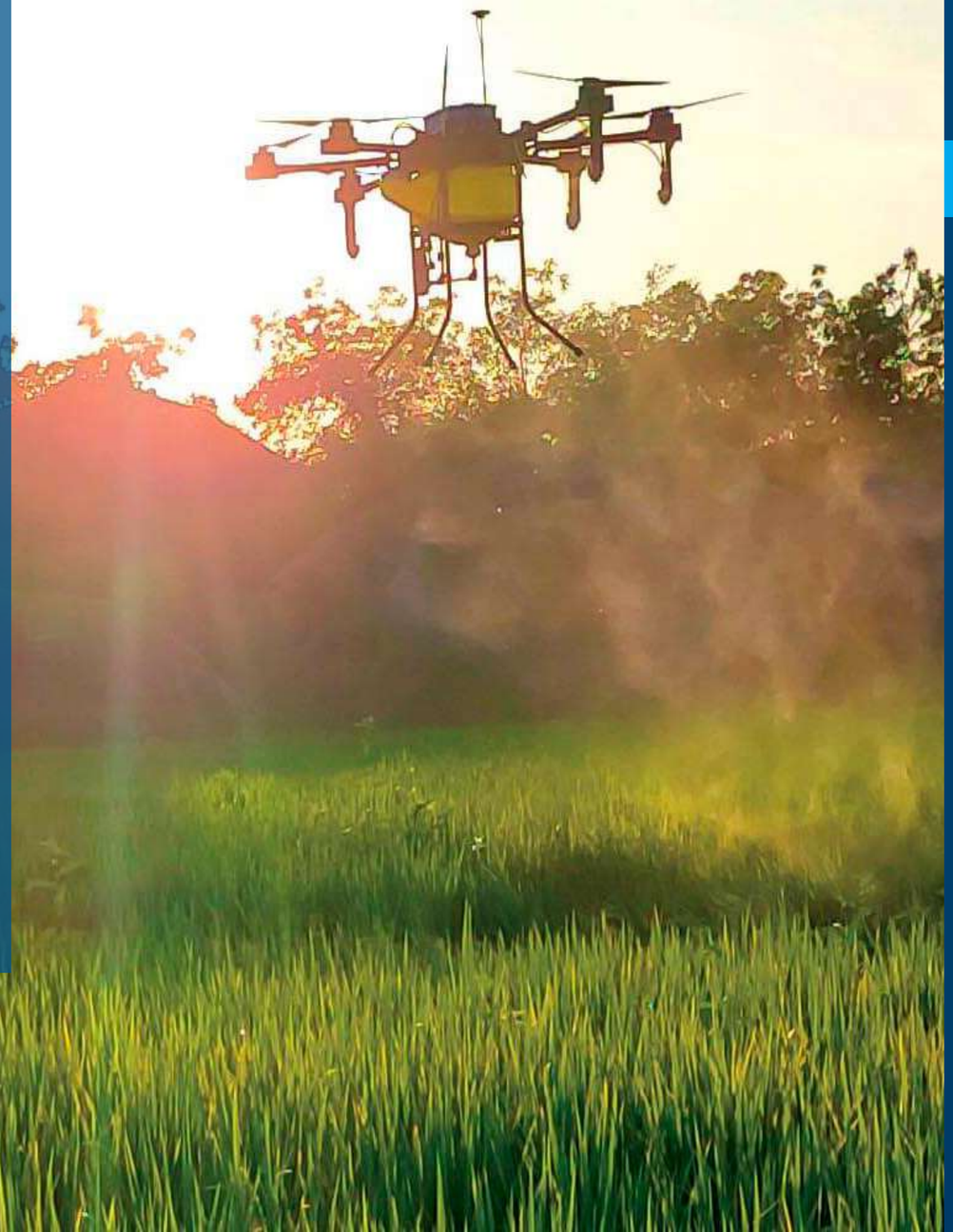
"We can seamlessly collaborate and make fast decisions. We've reduced our design cycle time by 30%." [4]

Abhishek Burman, CEO, General Aeronautics.

With a platform as agile as **3D**EXPERIENCE, they could respond quickly to urgent needs presented by the COVID-19 pandemic. General Aeronautics developed novel drones for large-scale sanitization and monitoring of infection hotspots across India.

"As a startup, we needed to be agile and felt that this platform can really help us make an impact on the ideation process."

Chinnarajan P., lead engineer, General Aeronautics.



4 -General Aeronautics Develops Drones to Tackle Sustainability

3. Be compliant and exceed quality expectations.

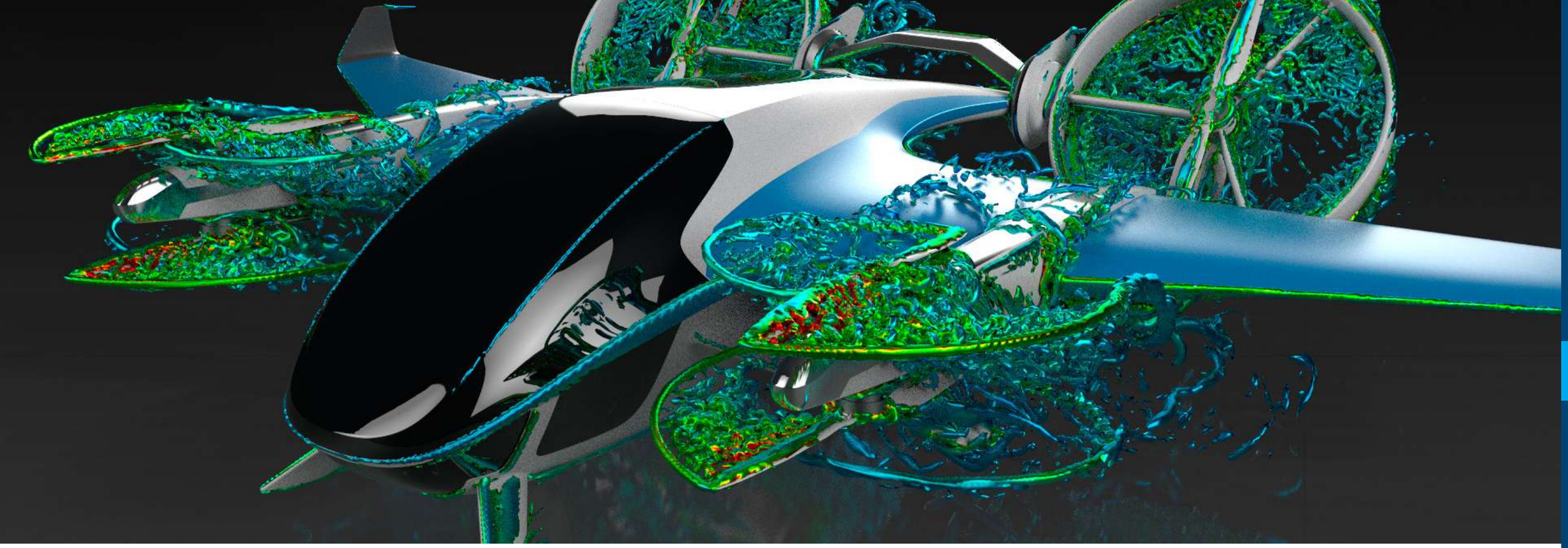
Address quality, compliance and safety challenges with an integrated set of tools for CAD, Model-Based Systems Engineering (MBSE), simulation and PLM. Tools and solutions work together in a single cloud-based platform so design and engineering teams can collaborate in real time to leverage the best ideas from all contributors and disciplines.

It's essential to build for safety early on in the design process and ensure certifications are achieved. Use the **3D**EXPERIENCE platform on the cloud to perform high-fidelity aerodynamic analysis and virtually test many different iterations to develop leading edge technologies.

Accurately predict, compare and simulate multiple product behaviors to reduce reliance on physical testing, bringing products to market faster while preventing risks and delays.

Multi-scale, multiphysics simulation helps you meet the highest safety and quality standards, for instance to design a quieter flight experience. Model-based engineering and governance provide full traceability and allow you to achieve certification earlier by demonstrating the safety of novel architectures to regulatory authorities.

Dassault Systèmes's proprietary knowledgeware ensures that all models are legible across disciplines, and integrated PLM provides visibility on the product development process from beginning to end.



4. Be unique and stand out from the crowd.

In the **3D**EXPERIENCE platform, the integration of high-end CAD functionalities from CATIA and proven simulation technology from SIMULIA have resulted in a paradigm shift. Instead of simply checking if a design meets requirements, these technologies make it possible to explore more design alternatives and create structures that are lighter, better optimized, and more innovative than in the past. Lightweight structures are key to maximizing range in eVTOL vehicle design.

Functional generative design on the **3D**EXPERIENCE platform is backed by the well-known Tosca solver and provides a topology optimization technique that identifies and removes areas of a design space not contributing to the stiffness of the part. This determines an optimum material distribution in a defined design area, while accounting for existing constraints to the design space such as boundary conditions, connections and pre-tensions, loads, and frozen regions. Perform validations on the optimized design and confidently select an ideal design variant using trade-off study tools.

One of the main challenges of using optimization in design is the difficulty in reconstructing a native CAD representation from simulation results. The functional generative design application has a one-click functionality to convert topology optimization results into CAD, with additional CAD reconstruction tools available, making simulation augmented design an intuitive and simple process.

Another point to consider is the human-centric design approach, putting the final customer at the heart of the experience. Beyond design innovation, it's also about considering the human experience and how to showcase the uniqueness of your design. Startups are using the platform's photorealistic rendering capabilities to create immersive experiences, from concept to reality — everything from detailed digital mock-ups to interactive 360° views.

HIGH-IMPACT STORYTELLING WITH ZURI

Czech-based startup Zuri plans to revolutionize the way people travel. Instead of having to go to a regional airport to catch a flight, passengers will simply book a journey with Zuri and take off from a spot nearby, like the roof of a skyscraper – no long landing strips required – and head to their desired destination. The company adopted the **3D**EXPERIENCE platform to design and produce its VTOL aircraft and create a virtual model they could use to showcase their design.

"We made a virtual twin of the one-seater prototype. This model is what we used for our presentation to investors. It's basically the entire experience: the interior, switching between the cargo and seated version. We even simulated the aircraft taking off and flying away, so they can see the VTOL in action.
It's high-impact storytelling in action. With this interactive, realistic experience, combined with real-time development data, we can demonstrate to them that this is a winning concept they can trust and invest in."

Michal Illich, Founder and CEO, Zuri

5. Be able to scale.

Imagine how fast and far you and your team could go with integrated modeling and simulation processes on a scalable platform available anytime, anywhere. Cloud computing easily handles very large assemblies for instant visualization.

Digital manufacturing methods also help small organizations scale up quickly. By planning, simulating and modeling global production processes, you'll find efficiencies in the manufacturing phases of the product lifecycle.

Leverage the tools and techniques used by industry giants like Boeing and Airbus via an IT-friendly offer that's right-sized for startups and innovation labs:

- Add new users and new roles as projects mature and business grows, as and when you need them.
- Add simulation or computing power on-demand with cloud credits.
- Enjoy ultra-fast, overnight deployment, automatic updates and included maintenance.

Adopt a solution that grows with you. The **3D**EXPERIENCE platform on the cloud is a complete product development solution that grows with you through any stage of your business development.

"All our apps are always up-to-date and we can add and remove functionality according to our changing requirements."

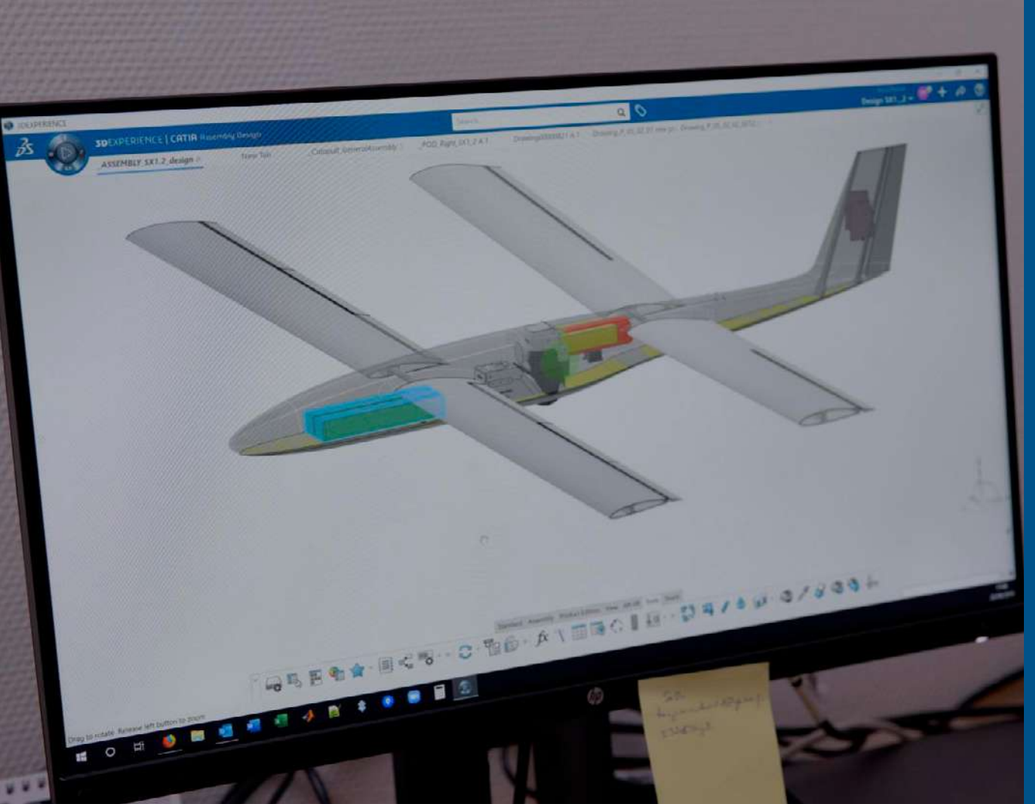
Eric Samson, Head of Engineering, Vertical Aerospace

The 3DEXPERIENCE platform enables engineering teams working on UAS, VTOLs, and other aerial vehicles to:

DEFINE AND VALIDATE YOUR CONCEPT RAPIDLY

Generate parametric designs using automation. Facilitate rapid learning cycles. Quickly transform an idea into a virtual flight experience. Digitally build and simulate a virtual prototype.

Start strong out of the gate—right when you're building a case for investors. Create mock-ups and renderings in the very early stages and get to a prototype in no time.



REMARKABLE DESIGN WORK AT XSUN

French start-up XSun used the **3D**EXPERIENCE platform on the cloud to design its energy-independent UAS, using solar power to create a cost-effective and sustainable solution to the power challenge.

It's using the capabilities of the **3D**EXPERIENCE platform on the cloud to find creative solutions to the challenges of eVTOL design, creating a double-support wing to increase the surface available to host photovoltaic cells and ensure optimal flight performance.

The SolarXOne's double-support wing makes it unique, but finding the right proportions was a difficult task.

"We are doing amazing design work, the surface quality, aerodynamics and overall geometry of each component... everything must be perfect otherwise the aircraft won't fly. And CATIA was perfect for that."

Andrea Viti, an aerodynamic and aerothermal engineer at XSun.

Collaborate Seamlessly

Enjoy seamless, secure collaboration with all disciplines, engineering domains and stakeholders wherever they are in the world. Centralize all project information in a single source of truth. Establish traceability for certification.

Gain End-to-End Visibility

Engineer a product while understanding the whole product development lifecycle, from cradle to grave. The full perspective from concept to manufacturing improves quality and speed of the end product.

Follow the electric flow from battery tests to wiring to battery integration. Implement aero-acoustics solutions. Ensure ultimate endurance and performance.

Execute with Precision

Control the design and engineering processes. Develop a multidisciplinary digital mock-up (DMU) combining structural technologies, sheet metal and additive manufacturing. Run multiphysics and mechatronics engineering.

SEAMLESS VTOL PROTOTYPING AT ASCENDANCE

Founded in 2018 by four former Airbus engineers, Ascendance develops solutions to help aviation meet its environmental objectives. Thanks to the development of its unique hybrid VTOL aircraft, the company is making air mobility greener and quieter. Ascendance uses computer-aided design, computer-aided engineering, simulation and model-based system engineering roles on the **3D**EXPERIENCE platform on the cloud.

"By using innovative technologies from Dassault Systèmes we are on track to prototype our vision effectively—and demonstrate what we have achieved at the 2024 Olympic Games."

Benoit Ferran, Cofounder & CTO, Ascendance Flight Technologies.[5]

5- Ascendance designs hybrid VTOL with model-based system engineering on the cloud

BUILD FOR GROWTH

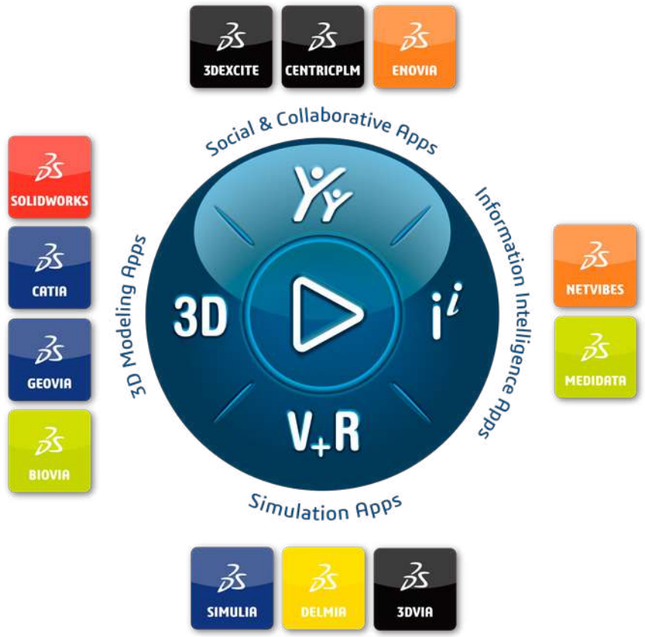
Simulate and understand the manufacturing processes. Provide a clear view of the next investment step. Be manufacturer agnostic; share readable product definitions with the best manufacturing partners in the world no matter where they are.

"We're building the company from the ground up and we have to take a modular approach. But we're also looking to the horizon and we're excited about the potential of what we can achieve with the 3DEXPERIENCE platform...
Each time I've looked for a solution, I've found it on the platform. It's so exciting."

James McMillan, Senior Design Engineer, Vertical Aerospace

The 3DEXPERIENCE platform on the cloud offers urban and advanced air mobility teams:

- Scalability to support a growing business.
- Continuity between design data and simulation data. No rework. No wasted time or materials.
- Integrated workflows across value streams and best-in-class design and simulation tools.
- Ease of use and peace of mind. Multidiscipline collaboration on the platform is simple and secure.
- Access to best-in-class product development solutions, training, co-marketing opportunities and a tailored onboarding program



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10, rue Marcel Dassault
CS 40501
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France

Asia-Pacific
Dassault Systèmes K.K. ThinkPark Tower
2-1-1 Osaki, Shinagawa-ku, Tokyo
141-6020
Japan

Americas
Dassault Systèmes
175 Wyman Street Waltham,
Massachusetts 02451-1223
USA