# DIGITAL CONTINUITY FOR THE AEROSPACE INDUSTRY

# SUMMARY

# 1 EXECUTIVE SUMMARY

Evolving industry means evolving **the way data** is managed.

Aerospace requires innovation, data requires management. New manufacturing demands coupled with the challenge of meeting new regulations in sustainability means a wealth of data to control. Companies must accelerate their efforts to stay on top of both the market and their information.

Effective data management requires digital continuity. It is the process of unifying data across an entire aerospace company and ecosystem. It is leveraging data analysis in key market trends such as:

Cost control measures | Strengthened regulations | Digitalization | Cross-company data collaboration

As a digital enabler, digital continuity works as a tool that accelerates the process of business transformations in the aerospace industry. It aids in the achievement of meeting difficult targets in aircraft development programs. By smoothing the process of these transformations, digital continuity boosts their overall efficiency ensuring compliance and allowing systems to function as intended.

Efficient program management and maturity control complement this idea. Emphasizing the constant evolution in aerospace means changing the way we think about the skillsets personnel need to adapt and develop.

Companies cannot rely on legacy models and existing management systems. Investing in digital continuity is the springboard for success now and in the future.

# 2 MAJOR TRENDS IN CIVIL AND DEFENSE AEROSPACE

**At its core, aerospace has always been about making use of the latest developments in technology. Yet how does this industry, known for its pioneering mentality, deal with the importance that data management has come to play? The way we process and collect information has changed just as radically as the industry has changed since the dawn of flight...**

Data continuity represents the next crucial leap that civil and defense aerospace must make to manage their operations. Ensuring data compatibility across an array of systems, platforms, and personnel allows for the swift sharing of data no matter how complex or how in demand a product is. Legacy systems are holding this transition back.

As a sector built on harnessing leading-edge technology, substantial amounts of data, modeling, and a high amount of risk-taking, the chances for this information to become incompatible is a real threat. This kind of technical debt only gets worse with time.

The aerospace industry is entering a new era of growth driven by a focus on sustainability goals, leveraging the emergence of new digital innovations, and facing an expansion in defense spending - meeting these developments means entering a period of growth following the pandemic slow-down across the entire industry.

This growth is driving the need to increase production for civil aerospace, including the retirement of older aircraft. War in Ukraine and geopolitical challenges have created new demand for defense capabilities as governments seek to bolster their national security obligations. These trends are placing additional pressure on aerospace design and manufacturing ecosystems.

Such trends are coupled with unique challenges seen across the entire aerospace industry, both defense and civil.

# 3 OBJECTIVES AND CHALLENGES

To address these challenges, civil aerospace original equipment manufacturers (OEMs) have undertaken important transformations with specific objectives in mind:

**- Reducing development lead-time.**
**- Decreasing CO2 emissions.**

In addition to these internal transformations, several market trends are influencing the aerospace industry and necessitating significant changes across all stakeholders:

### REPLACEMENT OF BEST-SELLING SINGLE-AISLE AIRCRAFT

The civil market is shifting towards newer models, prompting the need for OEMs to update their offerings and adapt to changing customer demands.

### ENHANCEMENT OF SUPPORT AND SERVICES

There is a growing focus on improving support and services, including the integration of connected products and assets.

### STRENGTHENED REGULATIONS AND END-TO-END TRACEABILITY

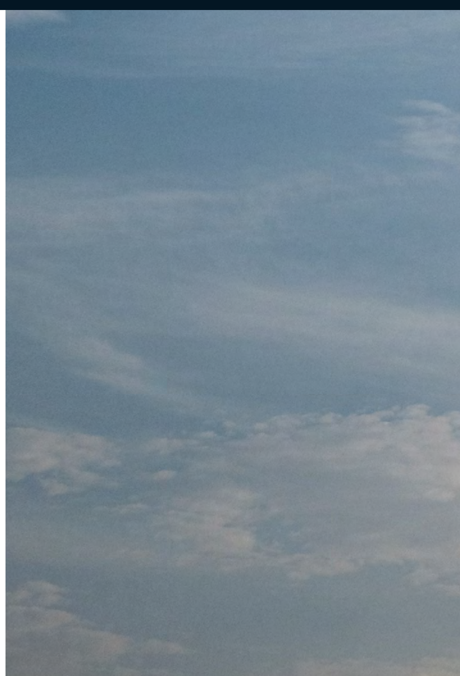
OEMs must comply with strengthened or new regulations, necessitating traceability from the design phase to recycling.

### CHALLENGING PROGRAMS WITH NUMEROUS PARTNERS

Both civil and defense programs are becoming more complex, involving multiple partners and collaborations.

### COST CONTROL THROUGHOUT THE SYSTEM LIFECYCLE

The industry is prioritizing cost control measures that span the entire lifecycle of aerospace systems.



Consequently, civil and defense OEMs must reimagine traditional engineering, manufacturing, logistics, and service processes while embracing comprehensive transformation agendas.

Data has never been more critical. But with so much going on, naturally different verticals will progress with different systems. The cost only appears when they try to collaborate, and quickly discover that their models, plans, platforms, and other digital resources are incompatible.

## So, what is the solution?

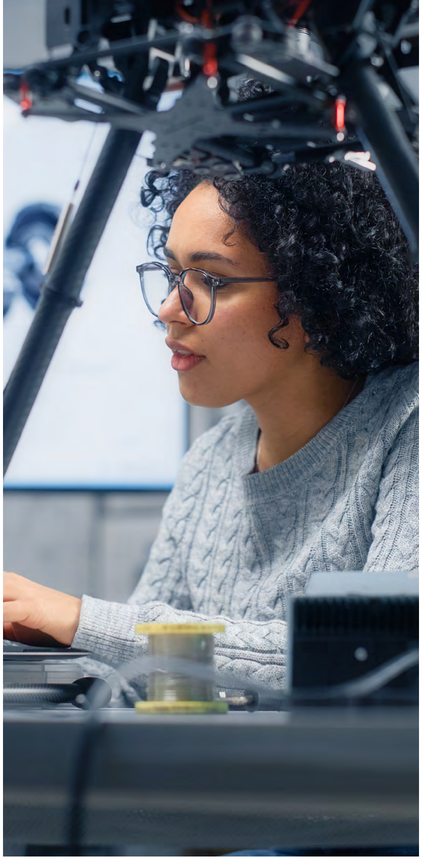
# 4 DIGITAL CONTINUITY - KEY CHARACTERISTICS EXPLAINED IN MORE DETAIL

**Digital continuity is a Digital Enabler of the way companies can better manage their data to make sure everyone is on the same page and works as a digital enabler, allowing for the deployment of leading data models and digital transformation.**

**It works as a digital twin, a kind of metaverse allowing for the centralization of data. It is a facilitator of models and data by gathering this information in a central location. It plays a crucial role in easing collaboration within a company.
Let's look at each of these in detail.**

## 4.1 DIGITAL TWINS

A digital twin is any customized digital representation of a service that assists operators in designing, producing, supporting, or using products. It is a virtual model designed to reflect its real-world counterpart. When a digital twin is based upon the concept of digital continuity, it becomes more cost-effective and accelerates the efficiency to create customized and tailored services – whatever those services may be. Digital twins are best understood as by-products of the process of digital continuity.



## 4.2 UNIFYING DATA ANALYTICS

Aerospace design is a complex procedure involving many different teams and processes. Leading aerospace designers, both civil and defense, must incorporate all the latest technological and digital trends. From avionics to aerodynamics, from design to marketing – each of these processes contains a dedicated team. Separate teams, however, need to work with the same data.

Digital continuity gives these teams the ability to look beyond their siloed tools and use data analytics in a meaningful, simplified, and unified way. This means avoiding duplication and creating unique definition models. It means a team working on developing an onboard smart system has access to the same data as a team working to model it in 3D. Think of its a virtual and living encyclopedia for models and data that anyone can access anywhere across the organization.

**20 years ago**

The master of the definition of the certified product was the 2D drawings, in paper then in digital with a lot of "definition" data.

**15 years ago**

The master of the definition of the certified product and industrial system becomes the 3D models, with digital "definition" data.

With limited 3D models replications , and engineers collaborating on the same models.

**5 years ago**

The master of the definition of the certified product is enriched with feedbacks from live data from operations.

These data improve the product and facilitate all the physical operations during the lifecycle.

## 4.3 COLLABORATION

The benefit of collaboration is digital continuity's greatest asset. It encourages and facilitates collaboration among different engineering disciplines. A manufacturing engineer and an in-service engineer can collaborate through efficient feedback loops and benefit from a unified source of data. Clarity in data from a single source means healthier cooperation while addressing diverse needs simultaneously. Everyone is on the same page.

# 5 EVOLUTION AND TRANSFORMATION

**Digital continuity has been steadily evolving over the last few decades, and that trend is not slowing down. Its scope has expanded in two main ways: to encompass multiple Systems of Interest (SoI) and to cover all phases of the development of these Systems of Interest.**

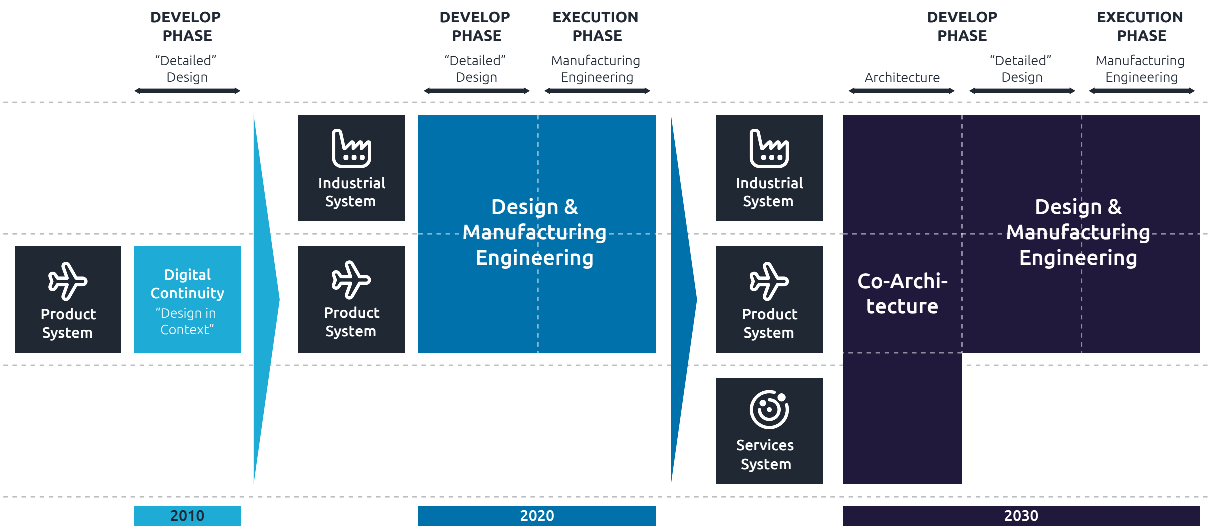
## In 2010,

digital continuity focused on product SoI and detailed design, reducing issues and clashes. Clashes between parts and assemblies by various suppliers were minimized.

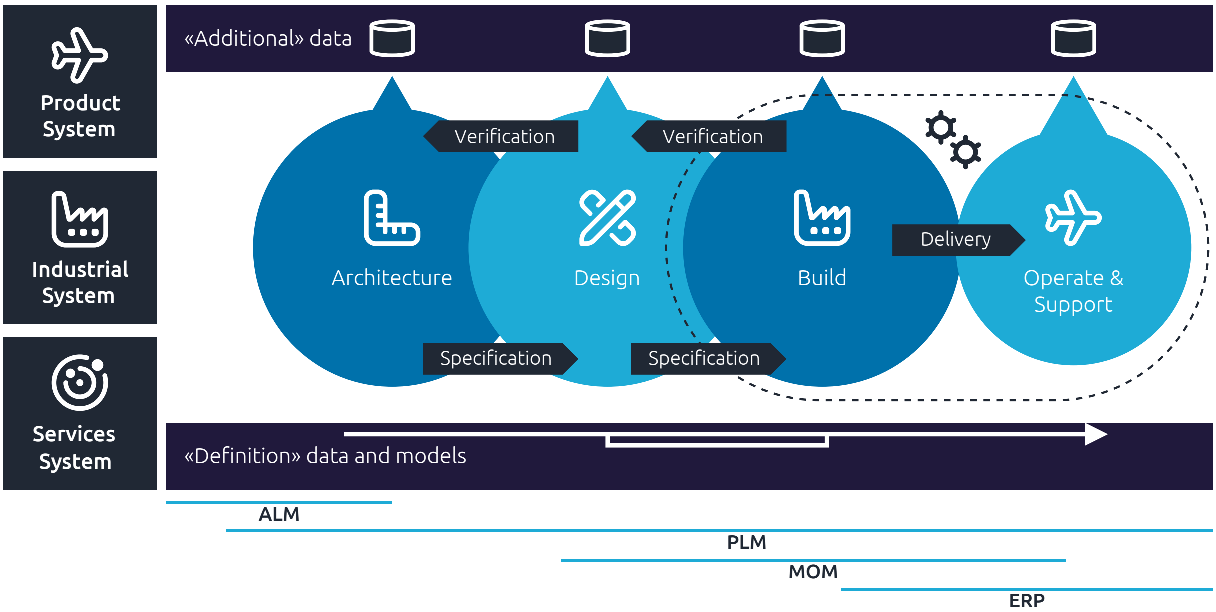
## By 2020,

the scope had expanded to include industrial system SoI and manufacturing engineering. This integration optimized the manufacturing process, resulting in reduced lead time.

**Looking ahead, in the coming decades and within the framework of new program developments, the scope of digital continuity will be further extended to encompass all three SoIs: product systems, industrial systems, and service systems. This extension would cover the end-to-end development phases, from the architecture phase to the support phase.**



This scope extension and ongoing transformation will also necessarily include vast amounts of data – not only in the form of definitional data and models, but also in the growing amount of data generated by automated process and connectivity. Any lapse in digital continuity at this stage will incur a substantial – and compounding – technical debt.




All the data and models: The DATA

## DATA

The **DATA** encompasses the Models but also others type of information (Data), we have categorized 2 big families

### "**Master**" Operational **Data and Models** (Virtual & Real)

A Model is an informative representation of something

- Object, person or system.

It **helps "human"** to better understand real world systems.

There are **several types of models**

- **Conceptual, abstract models, physical models**
- By nature, the model is a simplification of the represented things, not capturing all attributes but to capture those seeming relevant.

Model also had **a purpose with clear boundary and applicability range**

- it's created for a certain purpose and stakeholders.

### "Additional" real Data

"Additional " real Data that are all the data not pre-defined but useful to understand the history, the context, etc.. of the product design, manufacturing and support and usage

# 6 AN ENERGIZING EVOLUTION

**The transformation towards digital continuity in the aerospace industry is not without its challenges, but embracing this change is necessary if companies want to stay competitive and on top. By taking advantage of the benefits digital continuity provides, companies in the aerospace industry energize their efforts to keep ahead of competition and push their organization to new heights.**

Implementing digital continuity requires the support and cooperation of engineering, manufacturing, and service managers. This involves replacing local, legacy processes and tools with unified toolsets. These toolsets include things like product lifecycle management (PLM), manufacturing operations management (MOM), and integration with corporate enterprise resource planning (ERP) systems. The result is a boom for every member of the organization and promotes positive collaboration between employees.

The adoption of new processes, methods, and tools necessitates the redefinition and creation of job profiles. Roles such as an industrial architect or an industrial system engineer need to incorporate new skills like system engineering, modeling, and simulation skillsets.

While companies will be faced with this redevelopment of personnel, employees will need to upskill to optimize their ability to get the job done. Productivity and employee value benefits along with it.

Providers of digital continuity solutions will need to anticipate and address the aerospace industry's needs while considering existing legacy workflows. Mass amounts of data will need to be optimized in newer systems, and this means ensuring a positive user experience throughout the process.

Providing a secure and user-friendly environment for even standard users dealing with this large volume of models and data will pay dividends down the road.

**The greatest challenge will be the migration of data from legacy to future platforms.** Digital continuity relies on complete and accurate sets of data, which includes models, data in real-time, and ensuring a comprehensive and unified point of access. Particularly challenging will be migrating data from legacy platforms to ongoing projects.

These challenges, however, are mitigated by the necessity of this transformation. The increasing complexity of products, an industry built upon leveraging innovative technology, and the deployment of this technology all point towards the need for digital continuity.

Achieving these goals requires continuous control maturity, efficient program management, and collaboration across all disciplines in the industry's ecosystem.

# 7 THE FUTURE OF DIGITAL CONTINUITY IN CIVIL AND DEFENSE AEROSPACE

**Digital continuity plays a unique role in aerospace primarily due to the need for aerospace companies to stay on the edge of developing technologies.**

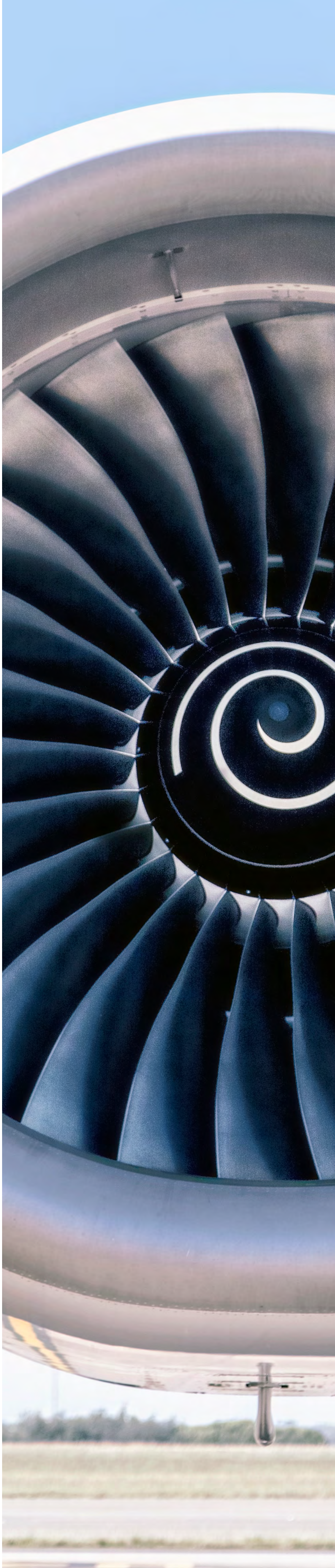
Harnessing models and data to produce things like 3D models and digital mock-ups means that this is only the beginning of a rapidly developing concept.

Data protection has never been more vital. The importance of end-to-end configuration management is necessary for certification. It also means ensuring projects are completed from start to finish.

Rapid developments in engineering like the systems engineering approach require a robust digital continuity enabler. Innovative approaches such as scaling from local to industry-wide processes, virtual validation, and compiling model-based processes all require a cohesive and unified system of data.

To ensure continued success and an optimized digital continuity journey, a few principles are worth taking into consideration:

- Strong sponsorship from top management that understands the value of digital continuity, prioritizing a top-down approach.
- Treating digital continuity as a transformative project by tackling the challenges that come with new ways of working.
- Maintaining an agile IT infrastructure which ensures optimized performance and stays on top of cybersecurity concerns.
- Transitioning away from data siloes and ensuring unity in data.
- Treating data as an asset: maximizing digital services such as AI modeling, machine learning, analytics, and the leverage these services provide.



# 8 KEY FACTORS

## 8.1 AEROSPACE IS AN EVOLVING INDUSTRY

Making use of the latest technology has always been the foundation of aerospace. Aging fleets and legacy systems are undergoing a rapid modernization. Defense aerospace technology must rise to the occasion as new, global threats emerge.

New skills are required, reliable and unified data is a necessity. Collaboration has never been more important, and employees need the tools and speed required to accomplish their goals. Innovative digital trends are leading to a new age of data management. Companies across the industry will need to adapt to this evolution and utilize the benefit of digital continuity.

## 8.2 NEW GOALS FOR A NEW ERA

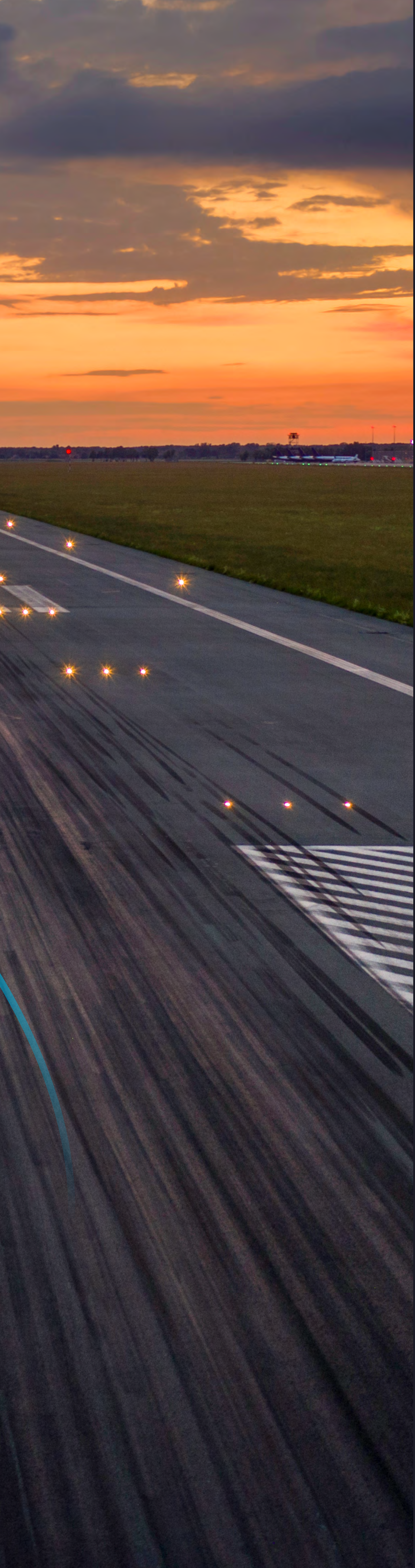
The post-pandemic slowdown is thawing. New demands in defense and civil aerospace call for a surge in manufacturing, planning, and development. Relying on past models is not enough. Companies will need to adapt if they want to meet the requirements of their clients and consumers.

Sustainability goals and regulations have changed the narrative on design, and consumer expectations have never been higher. War has brought home the reality that aerospace defense cannot afford to be a lingering industry. Governments, citizens, investors – the entire world is watching. These factors require next-level speeds in terms of digital management, company-wide collaboration, and a unified system of data.

## 8.3 THE INDUSTRY CANNOT RUN ON AUTOPILOT

Big data it’s both an opportunity (that has already proved value) and a threat. Particularly in the world of aerospace. Legacy models and management systems are creating a bubble, a technical debt that only compounds with time.
While the advent of flight changed the way we thought about transportation, the rise of big data, 3D modeling, AI, machine learning, and a variety of digital services are changing the way we think about the world. Companies will need to invest in this digital continuity if they want to stay ahead, and soar above the competition.


Digital continuity
is the jet engine
of data management.
Are you ready
to open the
throttle?



# ABOUT THE AUTHORS


**Antoine Scotto D'Apollonia**
VP Digital Continuity advisor
**Capgemini Invent**

**Pierre-André Vandelle**
System Architect and Digital Transformation
**Capgemini Engineering**

**Philippe Abdiche**
Principal consultant,
Digital Continuity Center of Excellence
**Capgemini Technology Services**

**Bruno Cathala**
Managing Consultant, Aerospace sector
**Capgemini Invent**

**Udo Lange**
VP - Head of Digital Engineering
& Asset Lifecycle Management
**Capgemini Invent**

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