
Aerospace & Defense Industry: 3 years' Overview



TRENDS SETTING THE COURSE FOR THE INDUSTRY WITHIN RECENT 3 YEARS

Currently, the aerospace and defense sector experiences gradual recovery following the tough 2020. Basically, the industry's development has been centered around manufacturing, digital transformation and emerging technologies implementation, and supply chain optimization.

2019	2020	2021
<p>Increasing demand for military equipment in response to geopolitical tensions</p>	<p>Main pandemic consequences:</p> <ul style="list-style-type: none"> ▶ retraction of forces from current affiliated operations, ▶ cancellation of military exercises in 2020, ▶ supply chain disruptions, ▶ increasing military equipment production and transportation costs, ▶ reduction of air traveling volumes, ▶ budget cuts, R&D underinvestments, ▶ decline in mergers & acquisitions activity. 	<p>Gradual recovery in passenger air travel</p>
<p>Production ramp-up as a result of growing aircraft demand</p>	<p>The need for significant investments for commercial aerospace recovery as result of air traffic volumes' reduction</p>	<p>Geopolitical tensions lead to defense stability</p>
<p>Significant mergers and acquisitions activity</p>	<p>Relative stability of the defense sector despite the pandemic</p>	<p>New opportunities for space industry (satellite broadband internet access)</p>

2019	2020	2021
<p>Digital transformation with focus on low-risk innovations: AI, augmented/virtual reality, IoT, data analytics</p>	<p>Adoption of low-risk digital solutions: digital supply chain management, secure business communications, automation tools, Factory of the Future/Industry 4.0</p>	<p>Transforming the supply chain into more resilient and dynamic networks</p>
<p>Modernization of aerospace and defense equipment</p>	<p>Record investments in the space sector despite the pandemic</p>	<p>Recovery of mergers & acquisitions activity</p>
<p>Implementation of More-Electric Aircraft paving the way for All-Electric Aircraft</p>		<p>Emerging technologies transforming the industry: advanced aerial mobility, hypersonics, electric propulsion, hydrogen-powered aircraft</p>
<p>Wide implementation of emerging technologies (AI, blockchain, augmented reality, cloud technologies, etc.) by the space industry</p>		<p>Sustainability (reduction of CO2 emissions)</p>

Obviously, the trends haven't changed significantly over these three years. The pandemic caused certain decline in their development, but in 2021, we can see the industry's step-by-step recovery. [1-6]

WHAT IS THE DOMAIN'S OUTLOOK FOR 2022?

Sustainability

A&D organizations are expected to leverage latest technologies and focus on technological and operational improvements to address the sustainability challenge. First of all, this refers to green manufacturing, namely reducing Scope 1 and Scope 2 emissions. This can be achieved by means of advanced technologies utilization (e.g., digital twin, additive manufacturing), selecting sustainable alternative materials, combining smart technologies and green energy, and supply chain reconfiguration along with streamlining shipping and distribution.

Reducing Scope 3 emissions is more challenging, but A&D companies should use emerging technologies such as sustainable aviation fuels and electric propulsion to reduce their significant carbon footprint. [7]

Advanced Air Mobility

Currently, some organizations have passed the research and development stage and are performing testing and piloting of the innovative vehicles. For example, NASA established the Advanced Air Mobility (AAM) National Campaign and has already started testing the all-electric vertical takeoff and landing aircraft that could serve as an air taxi in the future. Further developments and testing of these vehicles are expected to continue this year. [10]



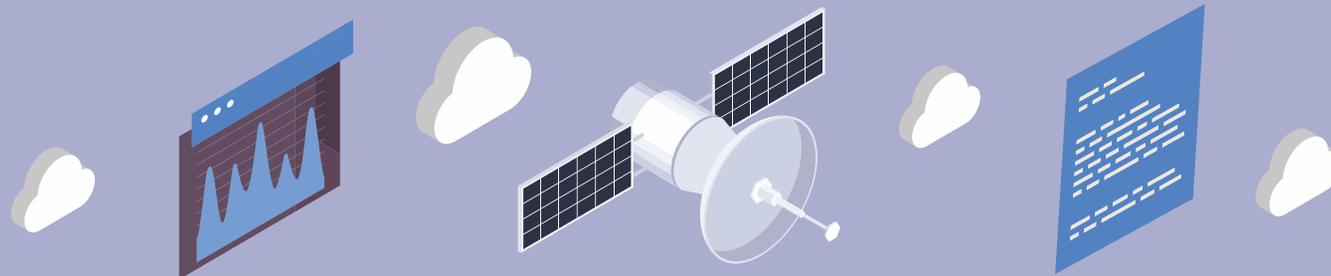
Space Market Growth

Several trends are going to shape the space economy in 2022.

- ▶ Increase in private investments in space companies, which will accelerate innovations coming to market.
- ▶ The rise of public-private partnerships: governments and companies will collaborate to reduce space risks for humans and manage space traffic effectively.
- ▶ Job opportunities creation: this refers not only to scientists and engineers, but also to those dealing with accounting, IT, marketing, design, manufacturing, and more.
- ▶ Licensing deals instead of building and owning strategies by government agencies. [9]

Smart Factory and Digital Thread

The A&D industry also has to cope with unprecedented innovations and increased complexity. These challenges can be addressed with the help of a digital thread and smart factory. The [digital thread](#) is an innovative approach to a product's whole lifecycle that facilitates interaction between the physical and digital worlds and makes it possible to collect real-time data and feedback along the way. The other innovative solution that can accelerate operational improvements is [smart factory](#) that involves connecting people, machines, data, and value chain in smart factory networks. These solutions will help A&D companies reduce costs due to optimized production, increased visibility, and better quality. [7]



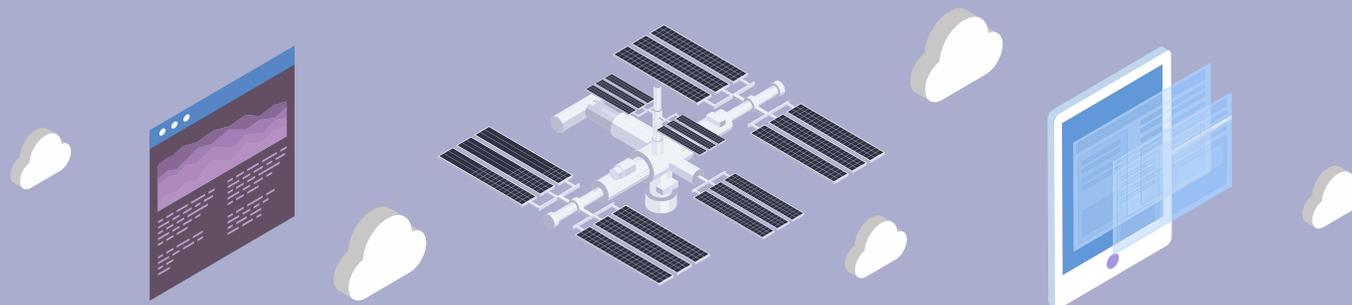
Military Technology Trends

New technologies aim to transform the battlefield in the following directions: sustainability, autonomy, connectivity, and lethality. The most influential ones are as follows:

- ▶ artificial intelligence, digital twin technology, and machine learning,
- ▶ advanced defense equipment,
- ▶ robotics and autonomous systems,
- ▶ IoT,
- ▶ virtual and augmented reality,
- ▶ additive manufacturing,
- ▶ big data,
- ▶ 5G,
- ▶ blockchain-based solutions. [11]

Mergers and Acquisitions

Defense M&A activity is likely to be driven by growing geopolitical competition and technological innovations, and is expected to develop actively in 2022 and further. Speaking about the deals in the commercial aerospace sector, they are likely to remain dependent on the post-pandemic recovery pace. As for M&A focus of aerospace and defense companies, they should be ready to execute those mergers and acquisitions that are associated with delivering innovative capabilities and expanding into new markets, e.g., hypersonics, space tourism, and electric propulsion. [8]



The Impact of Russia-Ukraine War on Aerospace and Defense Industry

► Rising demand for weapons.

This has been caused by two factors: providing military aid to Ukraine by the U.S. and some of the EU countries as well as the rearmament intention demonstrated by a number of NATO countries in response to the Russian aggression [12].

► Increasing defense spending.

Defense orders and future budgets in the U.S. and Europe are expected to grow significantly. What is more, over the next five years, spending on military equipment could rise up to 50% [13].

► Challenges for commercial aviation.

A great number of countries have closed their airspace as a result of the war: Ukraine, Belarus, and Moldova have done that due to the risks related to military actions, while air travel between a great number of countries (the U.S., the EU countries, Canada, and others) and Russia has been canceled. This poses certain challenges for commercial aviation, e.g., some flights have to be rerouted, which can increase their duration and fuel cost. [14]



WHAT CHALLENGES DO THESE TRENDS BRING IN A&D PROJECT MANAGEMENT AND HOW TO ADDRESS THEM?



PROBLEM: INCREASING NUMBER OF PROJECTS

In response to active development of the A&D industry (increased demand for weapons as a result of Russian invasion of Ukraine; the development of defense mergers and acquisitions activity; space market growth; research and development, etc.), the number of projects running in the A&D organizations will grow. In turn, this will require managing shared distributed resources and complex dependencies between all these initiatives.



SOLUTION: SETTING RIGHT PRIORITIES ACROSS ALL PROJECTS

Managing multiple projects simultaneously is impossible without determining what matters most for the moment. That is why the project with the most critical constraints should be taken care of first. Prioritization is equally important for the members of a project team: when they focus on the high priority tasks, they will avoid bad multitasking and overload, which in turn will increase their efficiency.



PROBLEM: MANAGING GLOBALLY DISTRIBUTED TEAMS

With globalization and remote work trend, the A&D companies will face a number of resource management challenges, e.g., keeping track of a huge amount of data related to thousands of employees working on hundreds of projects from various corners of the world, managing remote team members' competencies, and using this data for maximum efficient resource utilization.



SOLUTION: LEVERAGE AN EFFECTIVE RESOURCE MANAGEMENT TOOL

1. It analyzes employees' competences, capacity, demand, and availability data to suggest options for the most efficient resource allocation decisions.
2. It facilitates collaboration and optimizes joint work on projects by showing all the real-time changes in the system and monitoring teams' performance.



PROBLEM: UNCERTAINTY

Changes in the geopolitical and economic situation, namely Russia-Ukraine war and related challenges; consequences of the pandemic crisis; natural disasters; and even the application of technological innovations – these and other factors may lead to unpredictable events happening. They may significantly increase a project's lead time, but it's something you cannot estimate with the accuracy of an hour and can only prepare for.



SOLUTION: GET YOUR PROJECT ENVIRONMENT READY FOR UNCERTAINTY AND EMPLOY PROPER RISK MANAGEMENT

One of the ways to cope with uncertainty in project management is adding a time and budget buffer – in this case, the possibility of missing due dates is minimized if something goes wrong. The other important thing is proper risk management. Instead of being optimistic concerning a project's workflow, it's better to be prepared for at least those events that can be predicted.



PROBLEM: LACK OF SKILLED RESOURCES

As stated by [McKinsey](#), aerospace and defense organizations are facing certain talent challenges, for example:

- ▶ increased competition for employees with technological skills,
- ▶ growing demand for workers with specific skills able to deal with latest technological solutions,
- ▶ the number of employees with the above-mentioned skills is lower than that of those who are reaching the age of retirement.

This will lead to difficulties with staffing projects with the right resources, especially when it comes to those projects or tasks which require the application of innovative technologies.



SOLUTION: UTILIZE AVAILABLE RESOURCES WITH MAXIMUM EFFICIENCY

1. Plan resources' capacity – this will give an idea of their availability and demand.
2. Create teams of employees with a wide range of skills to make your resources interchangeable.
3. Apply the resource leveling technique if necessary: when available resources are limited, you can adjust a project's timeline in accordance with a critical employee's availability.
4. Manage the employees' workload – this will protect them from being overwhelmed and increase their efficiency.



PROBLEM: CYBER THREATS

Aerospace and defense is more than any other industry subject to frequent cyber attacks, breaches, or advanced persistent threats. It poses additional challenges for the industry's project management: any project involves collecting and storing certain sensitive data that can be vulnerable to cyber attacks. Cyber threats create serious risks for projects and related data and can even lead to their complete failure.



SOLUTION: PARTICIPATE IN CYBER SECURITY RISK MANAGEMENT

1. Firstly, it's important to analyze the customers' data that is stored on the company's servers, the devices used for that, and assess corresponding risks.
2. Secondly, project managers should take these risks into account when planning a project. It's a good idea to prepare for possible attacks and develop a plan that can be used in case something goes wrong.
3. Thirdly, when adopting any additional software solutions, it's important to make sure that they guarantee the safety of all the data you input.



HOW A MODERN MULTI-PROJECT RESOURCE MANAGEMENT SOLUTION CONTRIBUTES TO ADDRESSING CHALLENGES IN A&D PROJECTS

- ▶ Prioritizes projects and tasks automatically, recalculating priorities when any changes in the project environment occur.
- ▶ Makes it possible to monitor the state of all projects in a multi-project setting.
- ▶ Suggests options for informed resource allocation decisions based on the analysis of employees' skills and capacity.
- ▶ Facilitates collaboration, brings siloed and distributed teams together.
- ▶ Forecasts bottlenecks based on historical and real-time data.
- ▶ Simulates project flow changes for more informed decision-making.
- ▶ Keeps information on material resources used in projects.
- ▶ Optimizes employees' workload.
- ▶ Keeps project and enterprise data safe and secure.



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