Breaking the Cloud Barrier

Accelerating cloud-enabled transformation
in Aerospace and Defense

Aerospace and defense organizations have begun a very intentional journey to a cloud-enabled future. In an industry where high upfront costs and technological barriers to entry have been the historic norm, emerging players are taking advantage of adaptable cloud-based infrastructure to scale rapidly and compete with more established organizations. Incumbent organizations are leveraging the same cloud advantages to scale their capabilities, both up and down, in a more agile fashion. This sets the stage for a new wave of innovation in both aerospace and defense products themselves, and how they are designed, delivered and supported.

A steady flow of ever-changing high-impact challenges, ranging from talent shortages to multiple environmental and geo-political crises, have led organizations to realize that they need to be prepared for rapid and unforeseen changes to their operating environments. Cloud is critical to empower a flexible workforce and business continuity, to adapt more quickly to disruptions and to make more effective use of data. Cloud allows organizations to develop capabilities to efficiently augment or replace dedicated in-house solutions, provide resilient business operations and collaborate.

Cloud-enabled solutions blend traditional infrastructure, edge devices, on-premise and hosted cloud solutions across a continuum of hybrid models. While some applications may take advantage of public cloud's cost-effectiveness, others in the same organization may work on-premise to meet more robust regulatory and security requirements. Aerospace and defense organizations with the governance in place to 'right source' environments based on regulatory and operational requirements will have the controls to efficiently move between environments according to their changing needs.

Cloud is enabling innovation in aerospace and defense

Imagine if...

an engineer has a concept for a low-cost personal delivery drone system that coordinates drones from multiple households for larger deliveries and decides to launch a startup. The processing and data required to coordinate the drones is housed in a scalable cloud environment instead of adding to the cost and complexity of the individual drones. Designs and patents are developed in a cloud-based collaboration environment by the engineer and some of her colleagues. Product development and simulation is performed in low-cost, cloud-hosted 'inventor' versions of modern engineering tools. Hardware prototypes are developed and perfected in specialty fabrication shops using cloud collaboration and additive manufacturing. Limited initial releases are deployed, modified, and scaled in test regions and the organization's cloud-enabled business operations expand alongside the deployments. The result is speed, cross-organizational collaboration and higher development ROI.
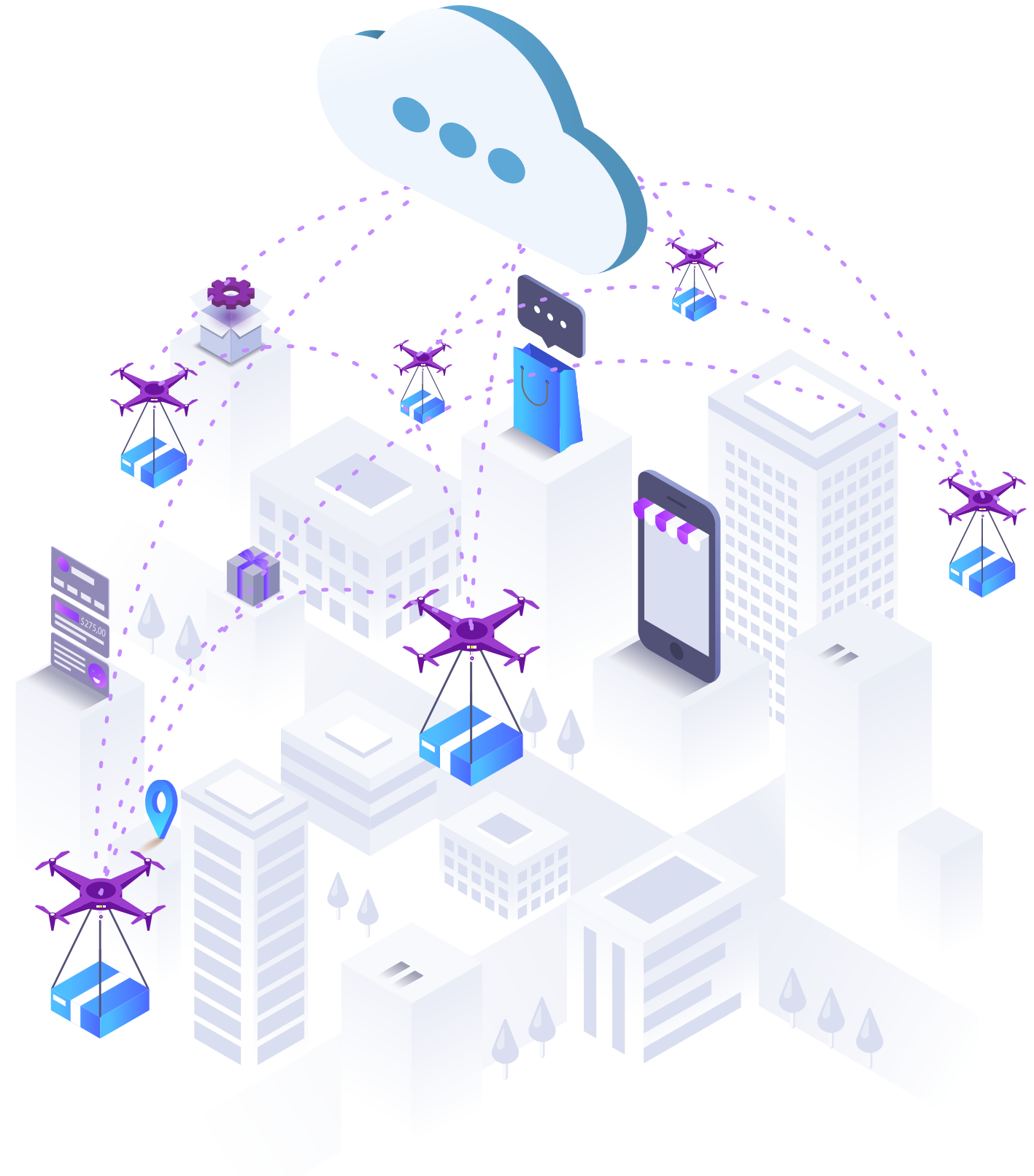
# Cloud technology approach for aerospace and defense

The rapid evolution of cloud computing in recent years is making it increasingly capable and cost-effective at addressing the unique demands of the aerospace and defense industry.

Cloud environments vary in their capabilities: some provide enhanced security, control over the physical location of resources and are even able to specify the nationality of the individuals administering the environment. Cloud-enabled infrastructure may be hosted within a company's data centers or be provided by one or more cloud service providers. It may encompass connected devices and also devices only temporarily connected via 5G or other wireless technology.

This hybrid/multi-cloud environment represents the superset of possibilities referred to as the 'Cloud Continuum' for aerospace and defense. The optimal mix depends upon the requirements of a given organization, program or application and will likely evolve over time. For this reason, Accenture has developed tools to accelerate the proactive disposition and ongoing adjustment of the solution mix across the Cloud Continuum with a focus on value.

Cloud Continuum

The unique requirements of the aerospace and defense industry demand that all implementations assume a hybrid architecture blending cloud, local and edge components securely, and intentionally remove selected components based on the demands of the specific solution.
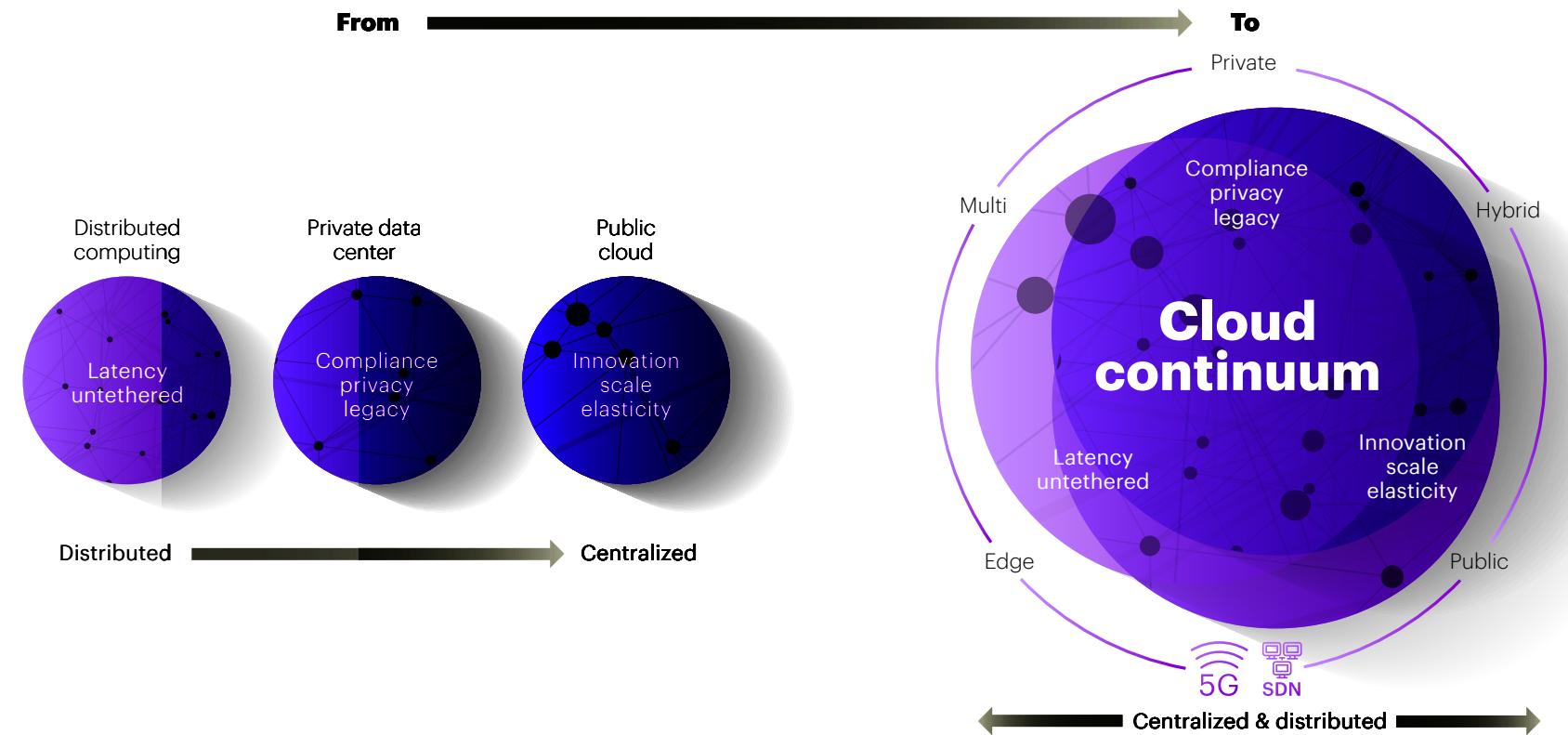
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Imagine if...

Sue is a former military pilot and specialist in refining human-machine cockpit interfaces. She joins a team working on a 6th generation fighter program to evaluate the interface between the pilot and aircraft. Sue is securely identified and permissioned in this environment in hours, instead of days. She can assess and refine information displays and control layout in a fully-immersive virtual cockpit while simulating flight operations using allocated compute capacity. Sue can alter the cockpit layout and rerun simulations, making changes based on her experience and objective performance data. Her feedback is shared with the project team and retained in the program's secure cloud. Once the specialized task is complete and Sue departs to support the development of a multi-drone/pilot interface. Resources and costs are adjusted immediately or enabled for other team members or programs.
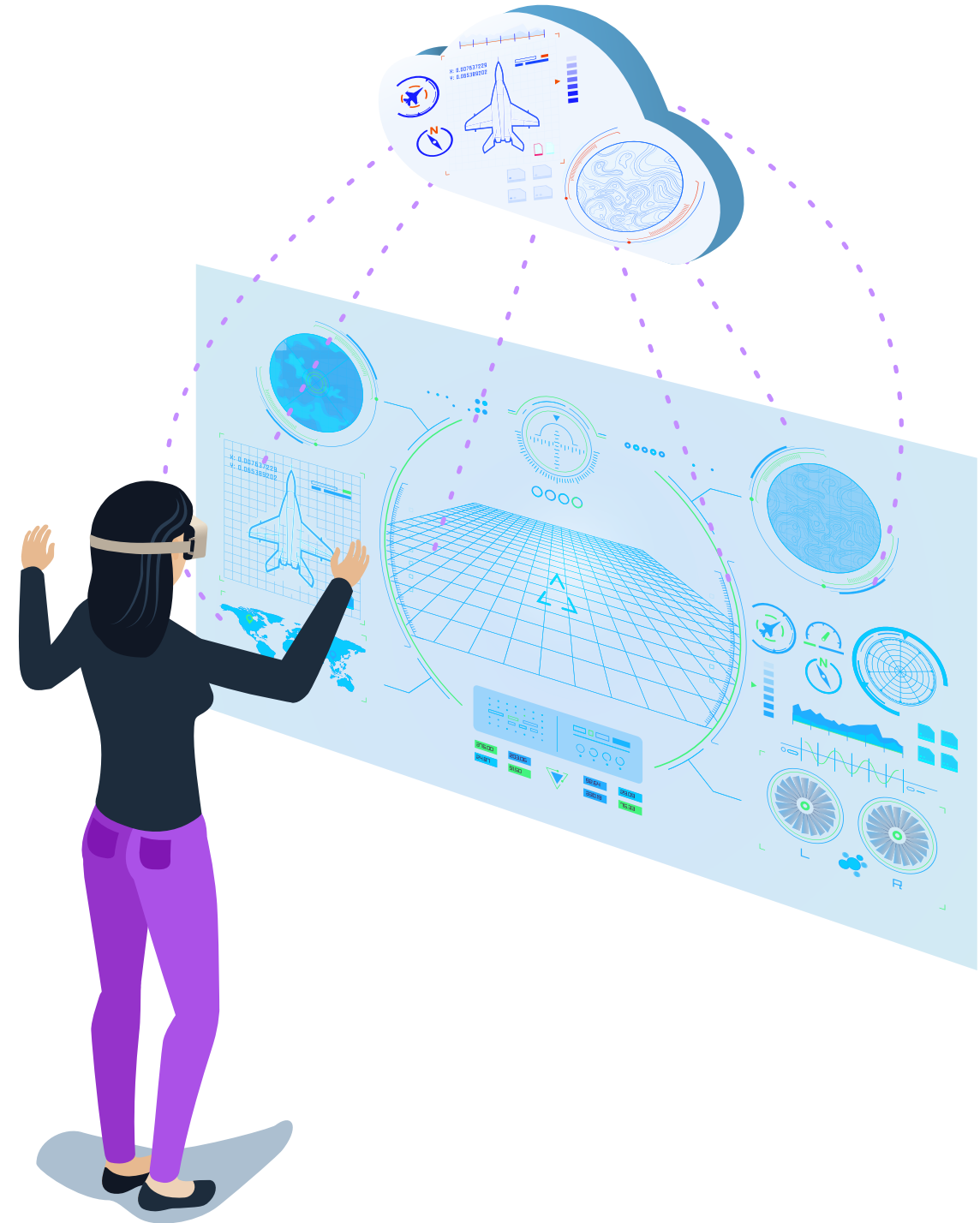
Leading the cloud journey

89% of companies across all industries have a multi-cloud strategy, meaning they intend to use more than one cloud service provider. 80% have hybrid cloud implementations (a mix of public and private cloud) with the average enterprise having seven 'clouds', ranging from public to private, under management. While hybrid-cloud architectures have been available for years, European aerospace and defense manufacturers have been at the forefront of their adoption largely due to the limited number of pure public cloud users and the significant complexity of data sovereignty requirements.[1]

Cloud-based capabilities are becoming increasingly common in highly-regulated industries, including Aerospace and Defense, and these industries also have the highest hybrid-cloud adoption rates. Organizations can often take advantage of public cloud for some of their basic capabilities, but require a more bespoke mix of solutions to meet the unique demands of most of their IT needs. This approach requires clear governance and management across the enterprise to deliver maximum value. Fortunately, a range of tools and strategies exist to manage these hybrid/multi-cloud environments. These toolsets often integrate governance, financial optimization, monitoring, security, compliance, automation and provisioning solutions in a common framework. Tools and the processes they support need to be adjusted regularly, as the landscape of available approaches continues to evolve rapidly.

✓ Information residency
✓ Jurisdictional authority
✓ Connectivity routing
✓ Resiliency
✓ Nationality of system administrators
✓ Self-service
✓ Security
✓ Regulatory compliance
✓ Threat response
✓ Information access control
✓ Performance
✓ Agility
✓ Auditability
✓ Complementary technologies (5G, AR...)

Cloud security for aerospace and defense

Security is a foundational necessity for cloud in aerospace and defense.

The unwarranted notion that commercial or government cloud is not as secure as on-premise environments has been a major reason why many aerospace and defense organizations have delayed cloud adoption. This sentiment is starting to change, as more defense players understand that "now is the time be bold"[2] and look towards cloud.

Aerospace and defense organizations are beginning to recognize cloud security as a benefit rather than a barrier to adoption, as industry leaders continue to prove its potential to enhance their overall security posture while minimizing risks. Those looking to grow their business through cloud adoption or to hasten the transition of workloads to cloud environments must set a security strategy, conduct proper planning and apply security best-practices. Foundational to this is enforcing a data governance and classification approach that provides an integrated view of the varied levels of security required across the enterprise's data.

The cloud advantage

How the cloud can enhance security

01 Information control:

Modern aerospace and defense operations and product lifecycles often require collaboration across organizational and geographic boundaries. A cloud-enabled approach allows this to happen without replication or transfer of information to domains outside an organization's control.

02 Efficient use of zero trust:

The modern aerospace and defense landscape requires flexible and extensible IT capabilities to support both business operations and the products and services provided to customers. The distributed and modular IT strategies that allow this require a zero-trust model, with all components and communication considered untrusted. Cloud implementations reduce the cost of operating in a zero-trust paradigm through their integration of zero-trust capabilities and cost-effective enabling of the required micro-segmentation.

03 Accelerated security compliance and greater resilience:

Cloud-native services include the right level of security controls that can accelerate compliance with ever evolving requirements. Cloud can also provide greater resilience through rapid back up, recovery and restoration of lost or compromised systems, with data centers operated by the major CSPs meeting enhanced physical security levels and typically have more robust disaster recovery and business continuity capabilities.

Cloud is enabling innovation in aerospace and defense

Imagine if...

non-sensitive data from all nations' satellites were collated and analyzed in a neutral cloud environment. Common areas of interest such as weather, climate, orbital debris and solar activity could be made available to all parties, with greater coverage and resolution. Critical information and alerts could be shared immediately, providing earlier and more accurate notifications. Researchers from all nations and institutions would have access to more thorough data sets, enabling better analysis and collective insight. All this could be accomplished while individual satellite owners maintain control of their sensitive data without exposing it to the common environment.
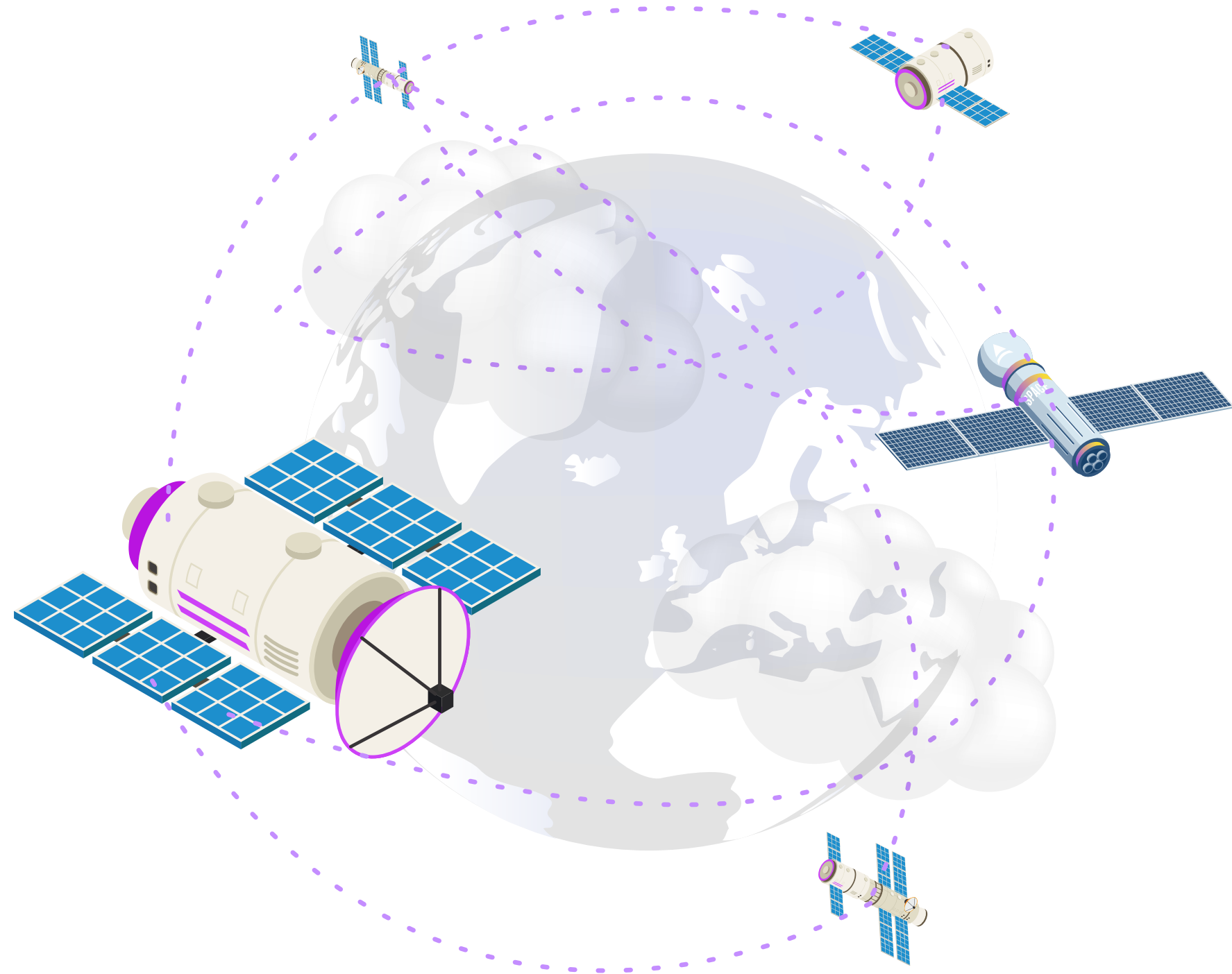
Cloud value for aerospace and defense

Cloud delivers value across multiple dimensions, but it's the operational efficiency that it creates that companies prioritize and which must be available for companies to move forward. Aerospace and defense organizations have not, to date, benefited from cloud service provider economies of scale as much as other industries, due largely to unique security demands. Yet CSP offerings that better meet regulatory, security, and operational requirements have caused a shift from large, intermittent infrastructure capital expenditure to more flexible cashflow models. And along with those financial benefits, there are a number of key strategic areas where cloud is an imperative for transformed business performance.

Financial savings are just the start

Modern-day aerospace and defense organizations require information technology to do more than just support the business strategy; it must inform and drive it.

The cloud in all its forms is the foundation that allows aerospace and defense organizations to become agile, efficient and responsive businesses that can successfully navigate today's unpredictable environment and set a course for growth. A successful cloud transformation journey must be part of a wider business strategy and used to attain measurable business outcomes such as the following examples:

Talent empowerment and retention: Cloud-enabled solutions can expand what is possible in a traditional workspace and allow flexibility in where and how work is done. Such solutions can attract an innovative workforce, improve the effectiveness of it by identifying specialized skills and managing them effectively across program silos, and boost work/life balance.[3]

Sustainability and footprint: Over the next three years, nearly 60% of aerospace executives sees sustainability as a crucial topic to address in their operations.[4] Cloud should be part of the answer by empowering remote workers, which can reduce the need for dedicated office space and the associated utilities, travel and supporting infrastructure costs.

Innovation optimization: The introduction of new technologies, such as AI and automation powers connection and collaboration across the extended enterprise. Cloud also unleashes all potential of other complementary technologies such as 5G, augmented reality (AR), high performance computing (HPC) and the Internet of Things (IoT).[5] These technologies can help organizations make more informed and quicker decisions, which can drive even more innovation.

Cloud is enabling innovation in aerospace and defense

Imagine if...

Juan is deeply skilled at aircraft maintenance; he repaired attack helicopters for the military early in his career and later earned a degree in mechanical engineering. He is part of a team designing a future vertical lift vehicle, with a design focus on serviceability. Juan currently works part-time from home following the birth of his second child. From his home office, he can use an AR headset with multi-factor authentication that allows access to his project team's digital twin. Cloud-enabled High Performance Compute provides a rendering of an immersive model of the full aircraft along with recently developed maintenance instructions for servicing microphones that are used for the acoustic location of threats. Juan pulls a microphone, sees a need to increase the length of a wire to improve access, and notes the required change in the instructions. AI in the environment spots that Juan is struggling to hold the microphone while servicing it and suggests including a tether to free up both of Juan's hands. After completing the task, Juan removes his headset and hears that his son is just waking up from a nap. He's unconcerned about saving his work as the updates to the project's digital twin are retained in the team's secure cloud environment where his colleagues in the office can continue to the work.

Velocity matters

In realizing the full value of a journey to cloud, benefits accrue according to the speed and scale at which cloud is integrated into the business.

100% of aerospace and defense executives agree that emerging technologies are enabling their organization to have a broader and more ambitious vision.[6]

The cloud journey not only accelerates internal transformations, but also helps reduce associated financial risks. Cloud can provide functional building blocks that help products get to market faster, meaning they can reduce development costs or start generating revenue sooner. Using a pay-as-you-go system for key IT infrastructure can help to control project expenses better, meaning financial support can be reduced or even stopped. In a time of disruption and uncertainty, better control over cash flow can be critical to a company's survival.

Cloud is poised to transform the aerospace and defense industry. Clearly, technology implementation alone won't deliver on the potential of cloud. Maximum value will only be delivered when cloud is leveraged as part of an overall architecture while enabling the business strategy. The architecture must span the cloud continuum from on-premise to hosted cloud and must consider emerging cloud-aligned technologies such as AI/ML, IoT, edge, 5G, high-performance compute and PaaS. All of this must be delivered with agility as business and technology landscapes continue to change.

This transformation must be bold for organizations to remain competitive. Existing and emerging aerospace and defense companies are building smart factories, efficient supply chains and more sustainable products all while attracting the best talent on the market. They are finding new ways to shape the transformation of our industry by leveraging cloud-based solutions to solve industry-specific problems. To succeed, they must fully understand the power of the cloud continuum and how they can apply for their own organization.

Equally important, leadership must adopt and infuse a cloud-first culture throughout the organization. The payoff from these steps can be substantial and help any organization unlock the full potential of their enterprise in the cloud. Leaders must be ready for every opportunity that comes their way with the cloud continuum and follow these three steps not to get left on the ground:

01 Establish a cloud enabled IT architecture integrated with business strategy that identifies the value and impact on business growth and profitability.

02 Develop a cloud-enabled transformation roadmap that integrates security and governance to ensure a secure and resilient business.

03 Adopt an agile business strategy inclusive of new technologies that will shape the future of aerospace and defense companies.

The time for aerospace and defense organizations to take advantage of cloud is now!

Authors

John H Schmidt
Aerospace and Defense
Global Industry Lead

Chris Tridico
Aerospace and Defense
Global Cloud Lead

Arthur Arkwright
Aerospace and Defense
Europe Cloud Lead

Contributors

Roy Hu

Brian York

Amy Bahrani

Jeff Wheless

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