



# Helping to Ensure Safe Skies with Simulation and Model-Based Engineering



***Reliable and secure avionics are essential for the safe operation of aircraft in both defense and civilian sectors.***

As aerospace and defense (A&D) innovation advances, an increased number of software applications and data exchanges among components pose new challenges for engineers.

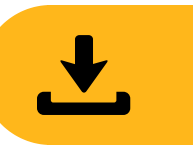
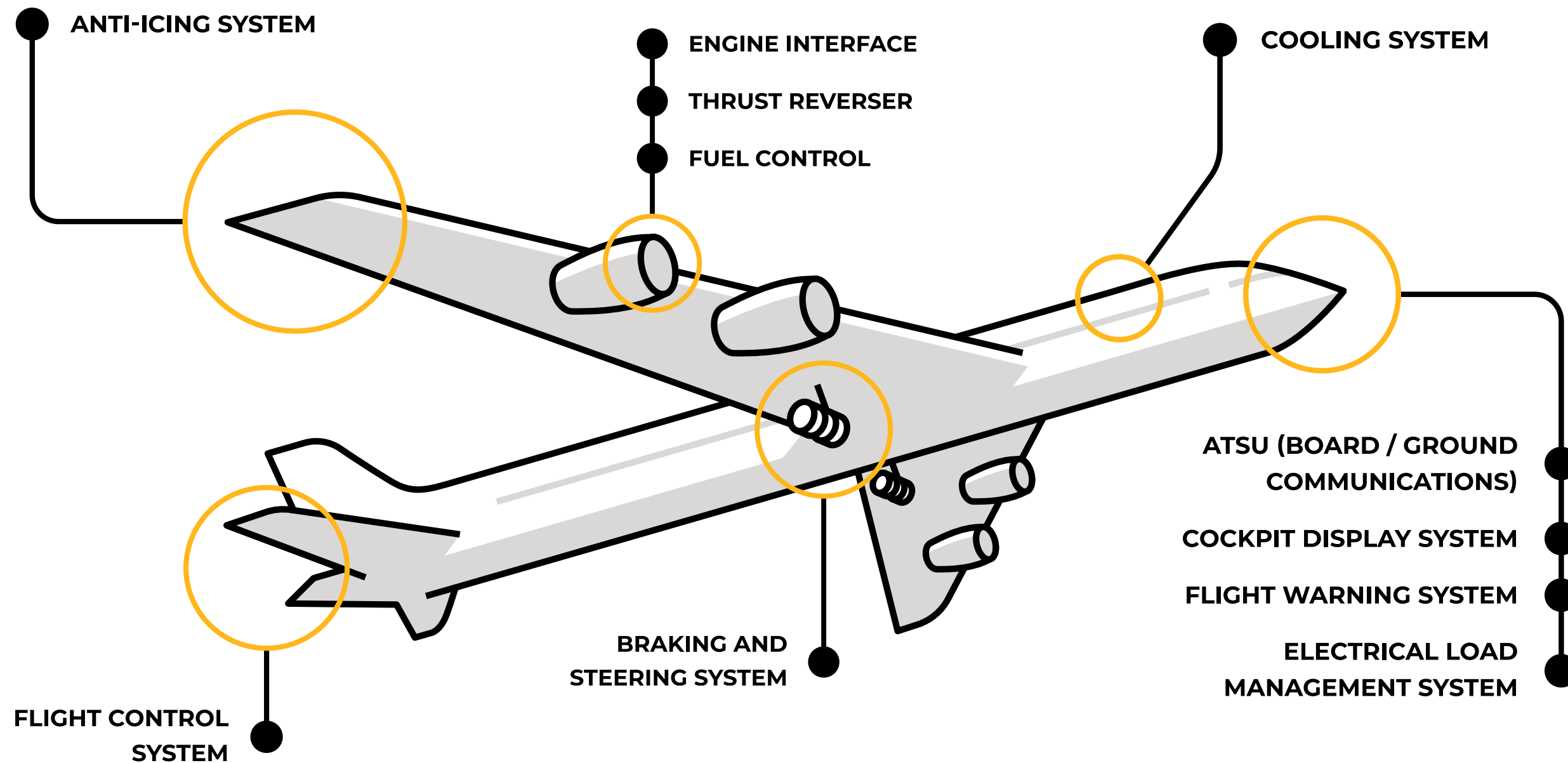
Using simulation and model-based engineering techniques, A&D companies can meet certification standards, and mitigate safety and cybersecurity risks.



# Embedded Software Growth is Accelerating

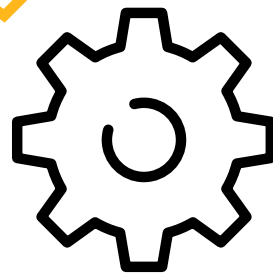
**Embedded software** plays a vital role in ensuring passenger and operator safety in airplanes, performing critical functions from tip to tail.

## APPLICATIONS OF EMBEDDED SYSTEMS IN AEROSPACE<sup>1</sup>

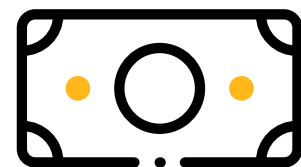


# Embedded Software Growth is Accelerating

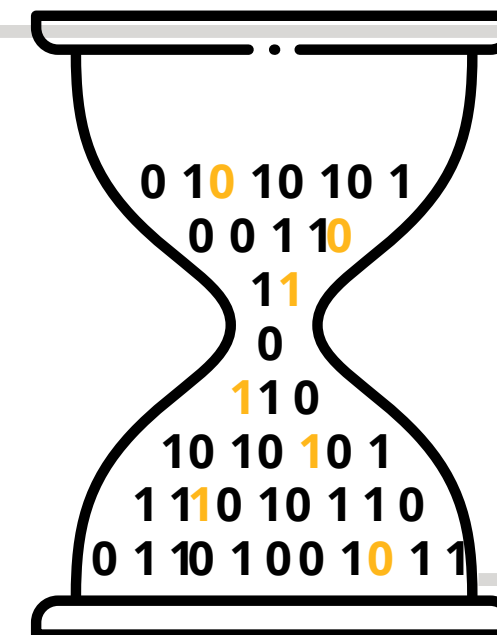
**Embedded software** plays a vital role in ensuring passenger and operator safety in airplanes, performing critical functions from tip to tail.



As aircraft software becomes more complex and advanced with automation, connectivity, analytics, and internet of things (IoT), the increased code volume requires longer testing times.<sup>2</sup>



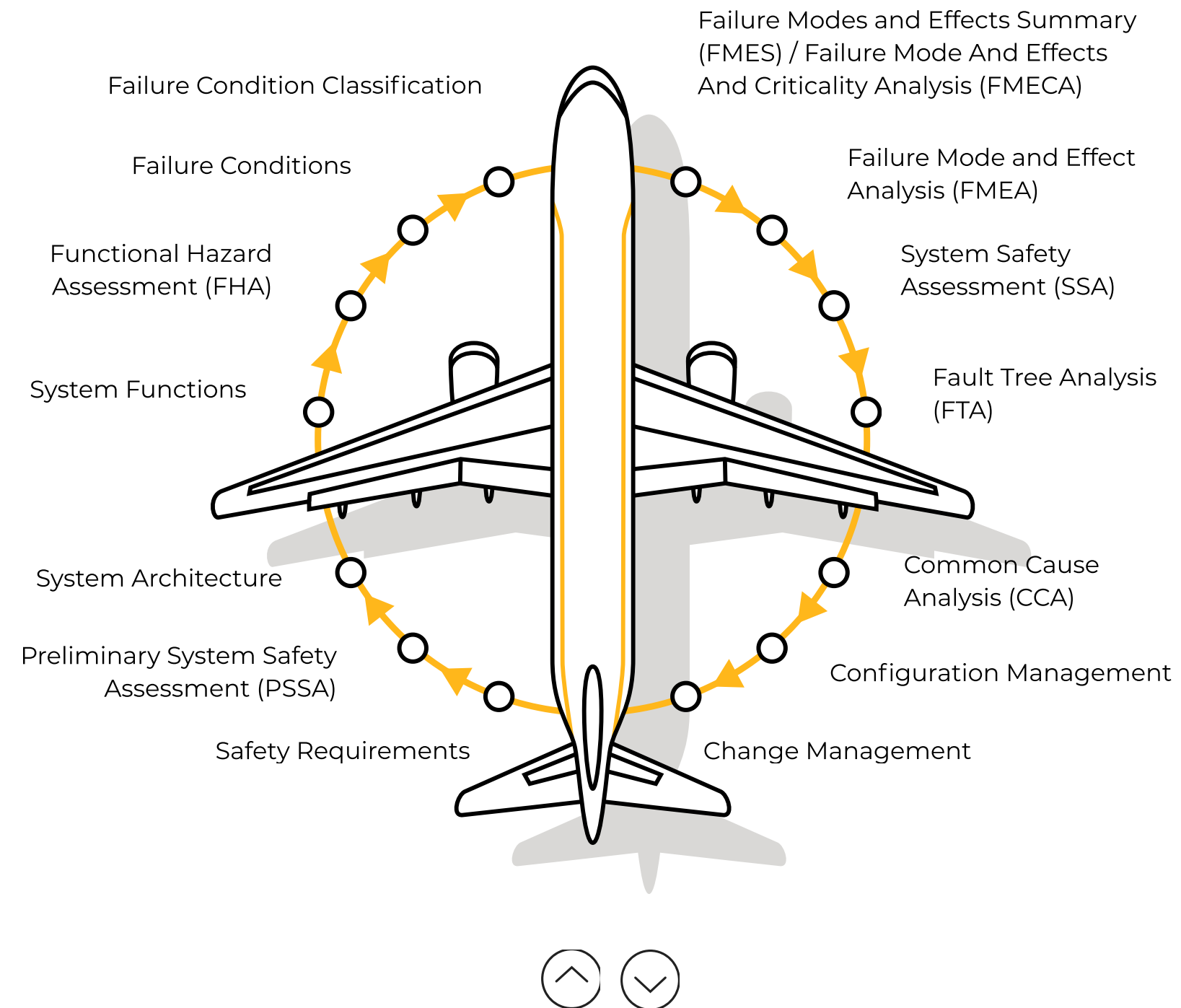
Embedded software development qualified with industry standards DO-178C, ARINC 661, and FACE in the system design and development phase significantly reduces costs and time in project development and testing.



# Safety Critical Systems Secure Aviation

**ARP4754A and ARP4761** are industry standards for developing safety-critical aircraft systems.<sup>3</sup>

## ARP4754A AND ARP4761 FUNCTIONAL SAFETY ANALYSIS METHODS<sup>4</sup>

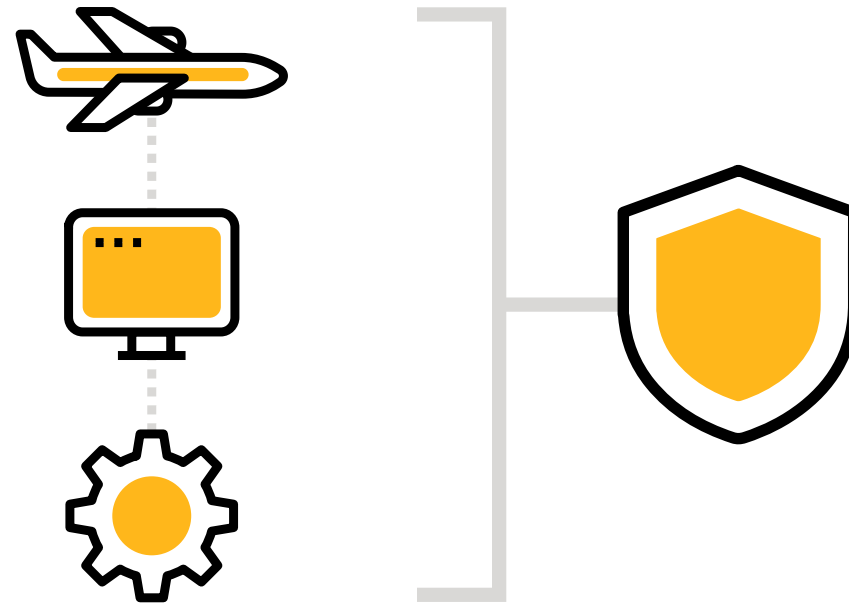


# Safety Critical Systems Secure Aviation

**ARP4754A and ARP4761** are industry standards for developing safety-critical aircraft systems.<sup>3</sup>

## **ARP4754A AND ARP4761 FUNCTIONAL SAFETY ANALYSIS METHODS<sup>4</sup>**

These methods need to be carried out consistently at various levels ranging from aircraft-level through systems to the detailed-item level.

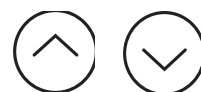
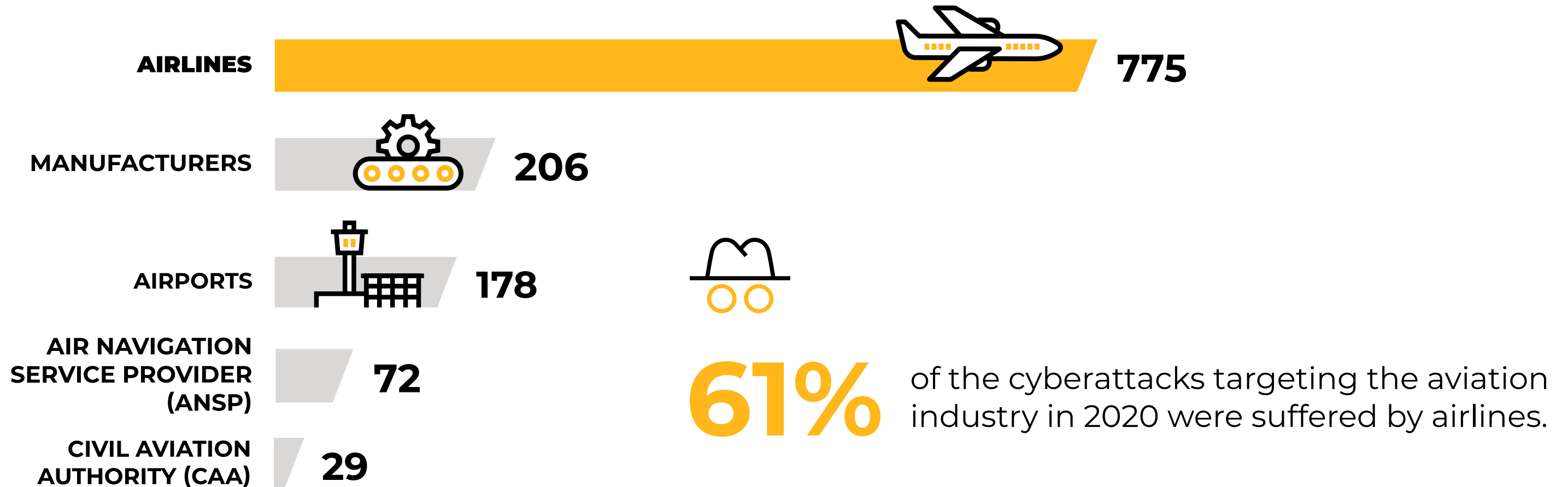


Model-based engineering can support functional safety analysis ensuring traceability and consistency, while accelerating the design and delivery of safe products in compliance with standards such as ARP4761.

# Protecting Aerospace Against Cyber Threats

Advancements in digitalization have led to increased cybersecurity risks, with reported incidents **rising by 530%** from 2019 to 2020.<sup>5</sup>

## AVIATION CYBERATTACKS BY SUBSECTOR IN 2020



# Protecting Aerospace Against Cyber Threats

Advancements in digitalization have led to increased cybersecurity risks, with reported incidents **rising by 530%** from 2019 to 2020.<sup>5</sup>

Projected annual ransomware costs alone are estimated to reach

**USD 20 billion**

for aviation companies in 2021.

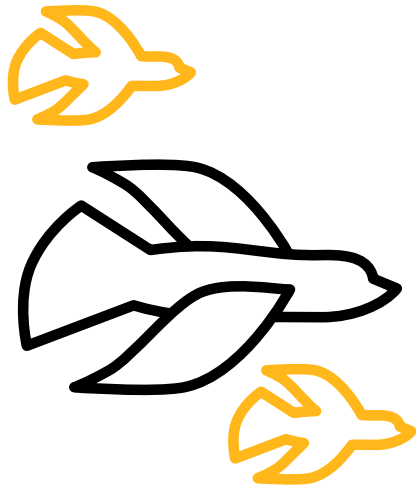


Model-based security analysis tools can help identify and mitigate all potential cyberattacks using key security analysis methods such as threat analysis and risk assessment (TARA) or attack trees, aligning with industry standard DO-356A.



# Helping Ensure Physical Safety and Resilience

**Physical safety** is vital in aircraft development due to numerous hazards, including wildlife and lightning strikes, that can compromise aircraft integrity and passenger safety.



The Federal Aviation Administration (FAA) reported an average of

**47 bird strikes**

daily in the United States in 2022.<sup>6</sup>

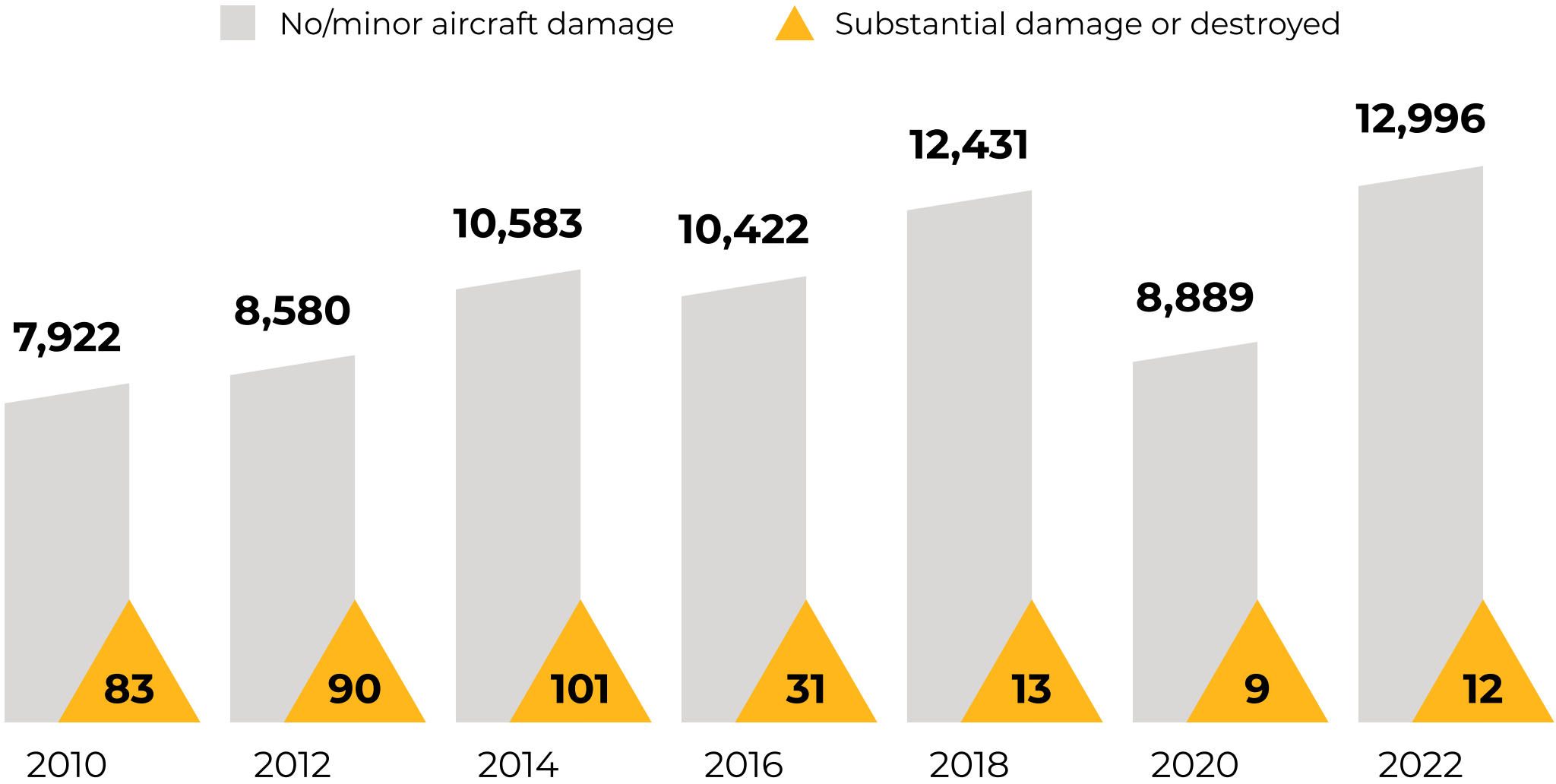




# Helping Ensure Physical Safety and Resilience

**Physical safety** is vital in aircraft development due to numerous hazards, including wildlife and lightning strikes, that can compromise aircraft integrity and passenger safety.

**WILDLIFE STRIKES ON AIRCRAFT AT U.S. PASSENGER AIRPORTS<sup>7</sup>**



# Helping Ensure Physical Safety and Resilience

**Physical safety** is vital in aircraft development due to numerous hazards, including wildlife and lightning strikes, that can compromise aircraft integrity and passenger safety.



Bird strikes in the year 2021 alone caused significant losses totaling

**USD 328 million**

in the US.<sup>8</sup>



Simulation plays a crucial role in assessing the crash and impact scenarios on passenger aircraft, allowing researchers and engineers to study and improve safety measures without risking human lives or costly physical testing.





**Discover more about solutions for embedded software, MBSE, systems engineering, safety, and cybersecurity:**

[Click Here](#)



1 **MSI**, 2020

2 **Mckinsey**, 2022

3 **SAE**, 2022

4 **Ansys**, 2022

5 **EUROCONTROL**, 2021

6 **FAA**, 2023

7 **USA TODAY**, 2023

8 **Simple Flying**, 2023

