Serving the Global Aerospace Safety Ecosystem with a Proactive, Integrated Systems Approach – An OEM perspective

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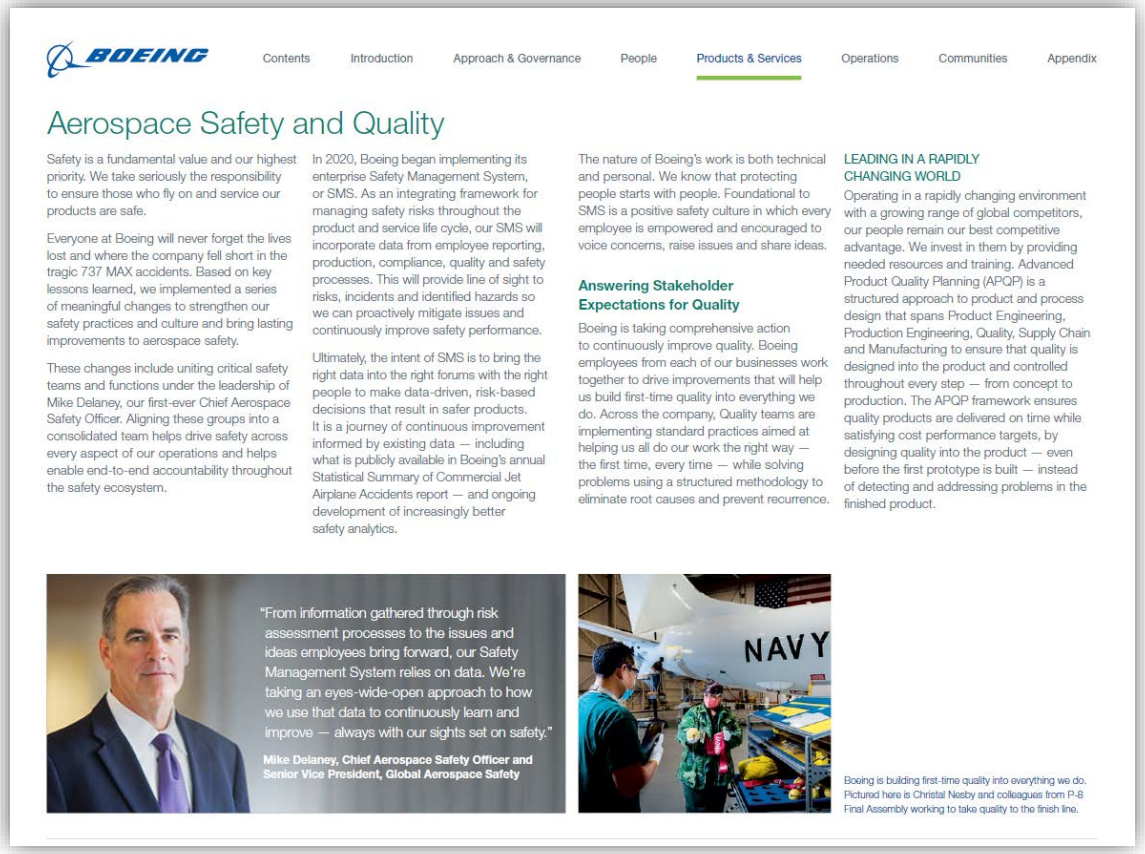
Mission:

- Drive aerospace safety to prevent accidents, injury or loss of life with our Boeing culture and actions rooted in safety

Guiding Principles

- We value human life, health and safety above all else
- We own safety, acting with integrity and transparency
- We serve the global aerospace safety ecosystem through a proactive, integrated systems approach
- Safety, compliance and conformance of our products and services without compromise



BOEING

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Aerospace Safety and Quality

Safety is a fundamental value and our highest priority. We take seriously the responsibility to ensure those who fly on and service our products are safe.

Everyone at Boeing will never forget the lives lost and where the company fell short in the tragic 737 MAX accidents. Based on key lessons learned, we implemented a series of meaningful changes to strengthen our safety practices and culture and bring lasting improvements to aerospace safety.

These changes include uniting critical safety teams and functions under the leadership of Mike Delaney, our first-ever Chief Aerospace Safety Officer. Aligning these groups into a consolidated team helps drive safety across every aspect of our operations and helps enable end-to-end accountability throughout the safety ecosystem.

In 2020, Boeing began implementing its enterprise Safety Management System, or SMS. As an integrating framework for managing safety risks throughout the product and service life cycle, our SMS will incorporate data from employee reporting, production, compliance, quality and safety processes. This will provide line of sight to risks, incidents and identified hazards so we can proactively mitigate issues and continuously improve safety performance.

Ultimately, the intent of SMS is to bring the right data into the right forums with the right people to make data-driven, risk-based decisions that result in safer products. It is a journey of continuous improvement informed by existing data — including what is publicly available in Boeing's annual Statistical Summary of Commercial Jet Airplane Accidents report — and ongoing development of increasingly better safety analytics.

The nature of Boeing's work is both technical and personal. We know that protecting people starts with people. Foundational to SMS is a positive safety culture in which every employee is empowered and encouraged to voice concerns, raise issues and share ideas.

Answering Stakeholder Expectations for Quality

Boeing is taking comprehensive action to continuously improve quality. Boeing employees from each of our businesses work together to drive improvements that will help us build first-time quality into everything we do. Across the company, Quality teams are implementing standard practices aimed at helping us all do our work the right way — the first time, every time — while solving problems using a structured methodology to eliminate root causes and prevent recurrence.

LEADING IN A RAPIDLY CHANGING WORLD

Operating in a rapidly changing environment with a growing range of global competitors, our people remain our best competitive advantage. We invest in them by providing needed resources and training. Advanced Product Quality Planning (APQP) is a structured approach to product and process design that spans Product Engineering, Production Engineering, Quality, Supply Chain and Manufacturing to ensure that quality is designed into the product and controlled throughout every step — from concept to production. The APQP framework ensures quality products are delivered on time while satisfying cost performance targets, by designing quality into the product — even before the first prototype is built — instead of detecting and addressing problems in the finished product.

Boeing is building first-time quality into everything we do. Pictured here is Christal Nesby and colleagues from P-8 Final Assembly working to take quality to the finish line.

Global Air Transportation System

Promote Worldwide Safety Culture

Cooperation

Aligned Focus

Assure Healthy Safety Foundation

Promote Proactive Risk Management Approach

Data Driven

Sharing Knowledge

Design ✈ Build ✈ Operation ✈ Maintenance ✈ Infrastructure ✈ Regulation

Working together for a Safe and Efficient Global Air Transportation System today and in the future.

Safety Initiatives

Boeing Safety Practices & Culture
Enhanced Oversight
Safety Management System

Advanced Analytics
Boeing Safety Intelligence

Causal Chain

Operational Safety
Global Aerospace Safety

Transparency & Learning
Safety Experience at Boeing

Serve the global aerospace safety ecosystem

Adherence to Airworthiness Regulations

Compliance and conformance ensure safety at delivery:

- Airworthiness regulations establish the minimum standard for design safety
- Boeing requirements exceed regulatory standards in some cases
- Type certification process ensures compliance to applicable airworthiness regulations
- Production processes / certification ensures product conformity to the type design

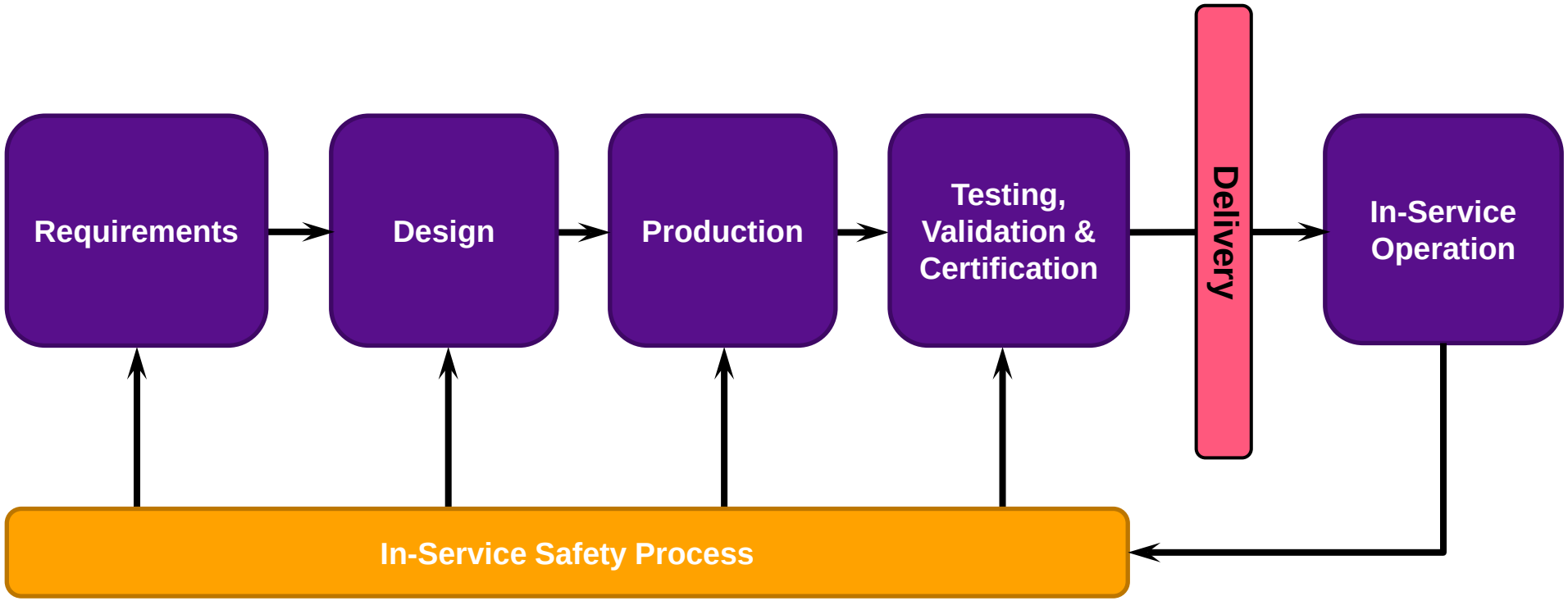
In-Service Safety Process (ISSP) ensures the continued operational safety of the fleet throughout the product lifecycle:

Continuous monitoring of product performance to identify potential safety issues

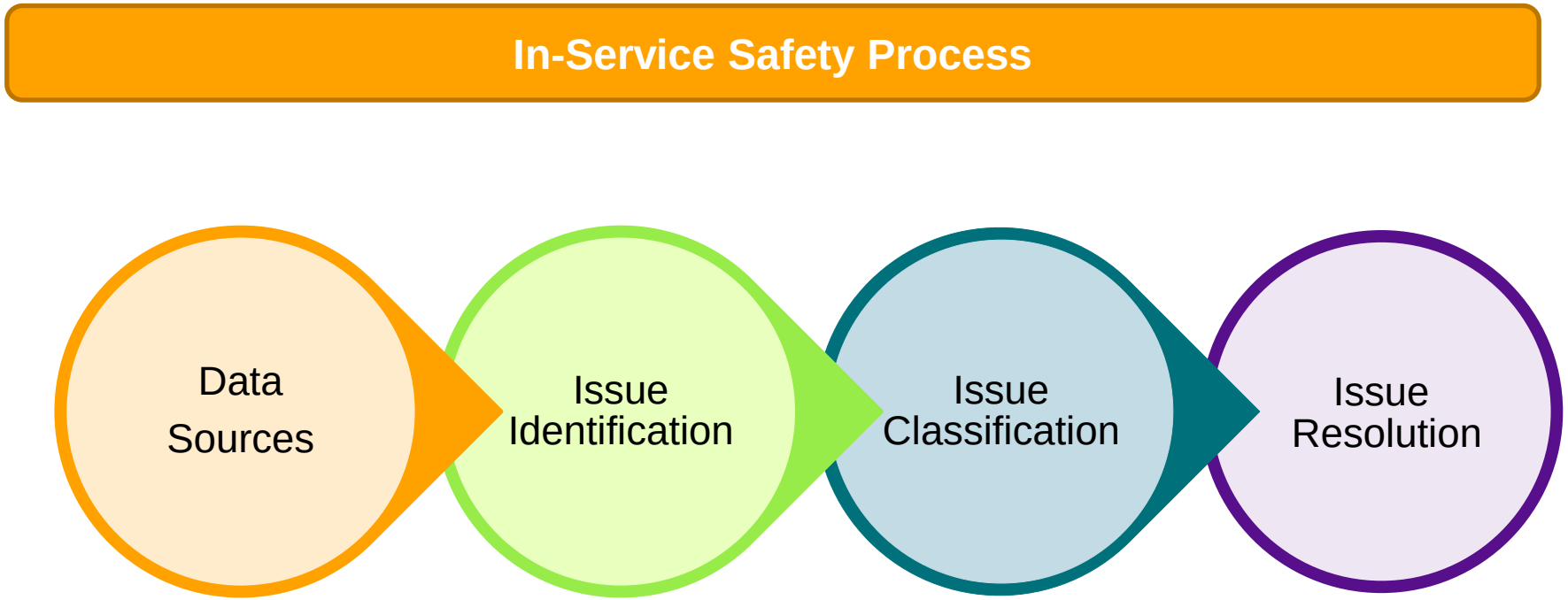
- ISSP develops recommended corrective actions to maintain or restore the airworthiness of the fleet
- Safety decisions and corrective actions may exceed regulatory standards
- FAA may mandate corrective actions via Airworthiness Directive

Certification and production conformity ensure the safety upon delivery and the In-Service Safety Process ensures safety throughout the product lifecycle

Boeing Commercial Airplanes' In-Service Safety Process



BCA In-Service Safety Process



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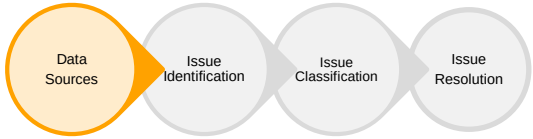
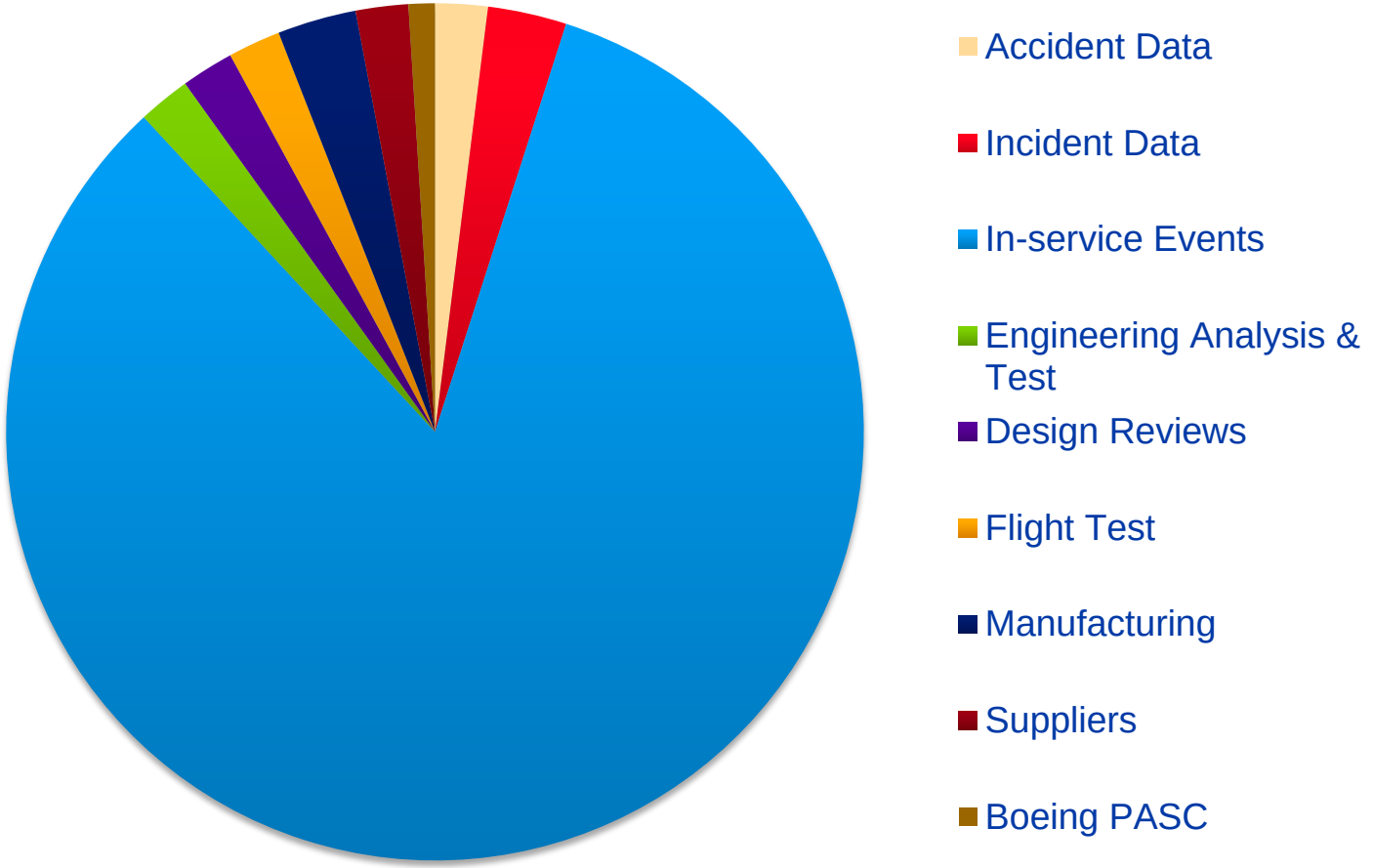


Data Sources

- In-service Events (Operator Communication & Boeing Field Service Teams)
- Suppliers
- Manufacturing
- Boeing PASC
- Engineering Analysis & Test
- Design Reviews
- Flight Test
- Accident and Incident Data

Approximate Data Source Distribution



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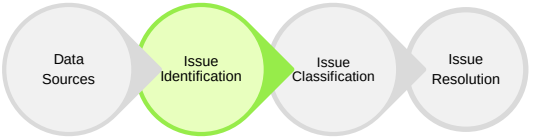
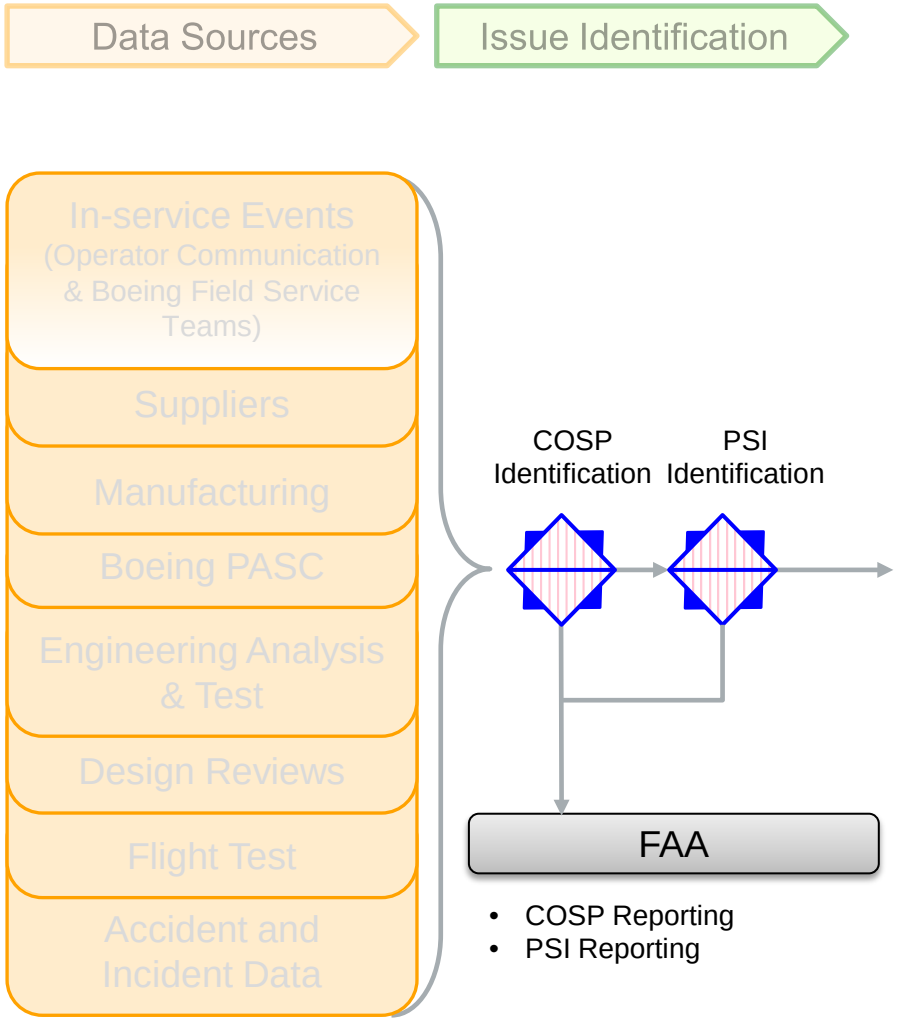
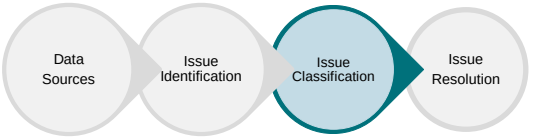
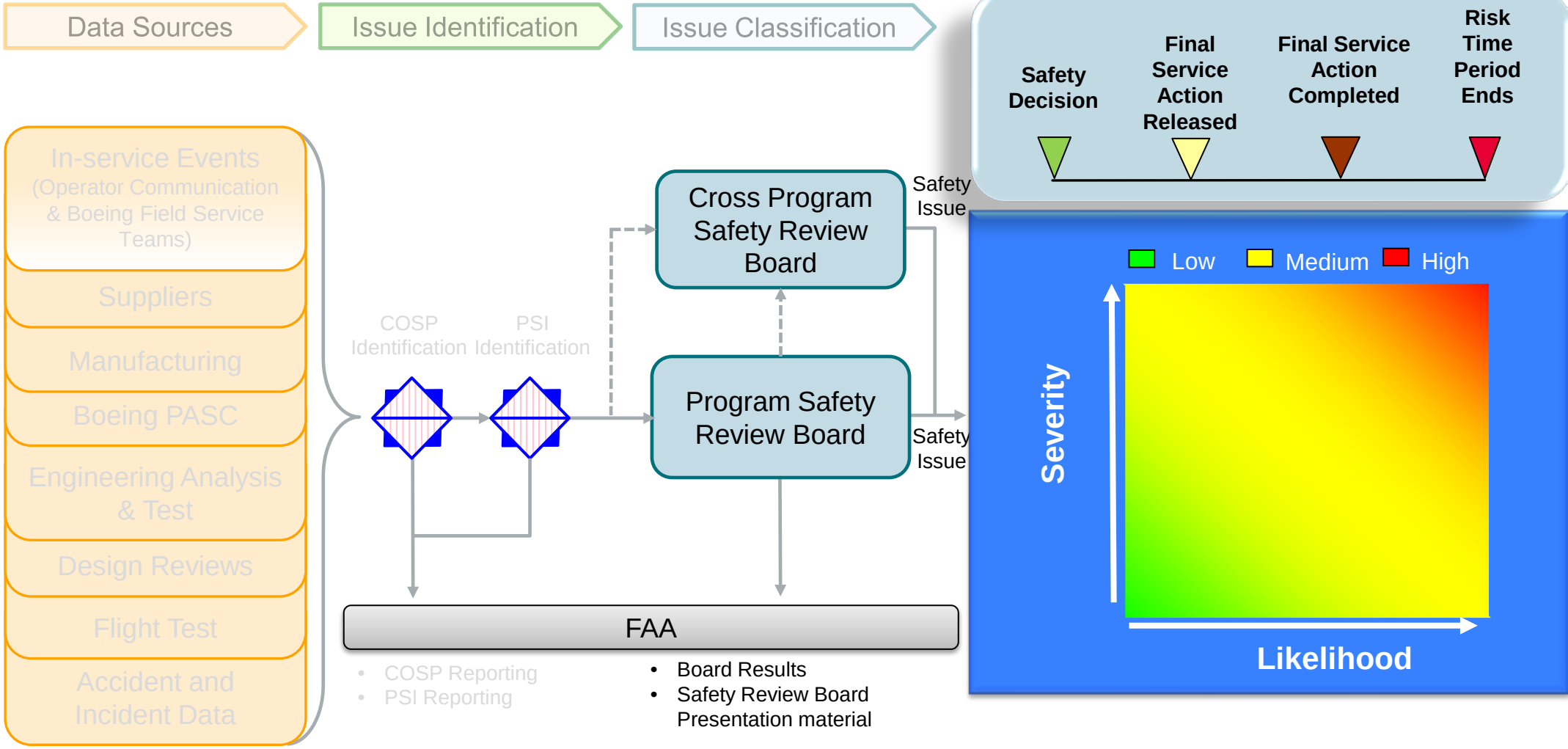




COSP Criteria	PSI Criteria
Satisfies and expands upon the reporting requirements in FAR 21.3	Identifies safety-significant events and conditions
Example: Any event that results in Engine, wing, or fuselage contact with the runway	Example: Any event that results in Engine, wing, or fuselage contact with the runway. Exclude events related to weather conditions such as gusting crosswinds, microbursts, or downdrafts associated with thunderstorms.

BCA In-Service Safety Process





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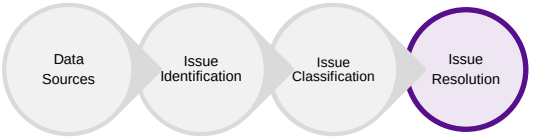


Data Sources | Issue Identification | Issue Classification | Issue Resolution

- In-service Events (Operator Communication & Boeing Field Service Teams)
- Suppliers
- Manufacturing
- Boeing PASC
- Engineering Analysis & Test
- Design Reviews
- Flight Test
- Accident and Incident Data

COSP Identification

PSI Identification

Cross Program Safety Review Board

Program Safety Review Board

Safety Issue

Safety Issue

Operator Engagement

- Lead Airline Engagement
- FTD/MOM communication

Customer Services

Corrective Action

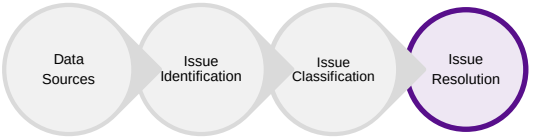
FAA

- COSP Reporting
- PSI Reporting

- Board Results
- Presentation material

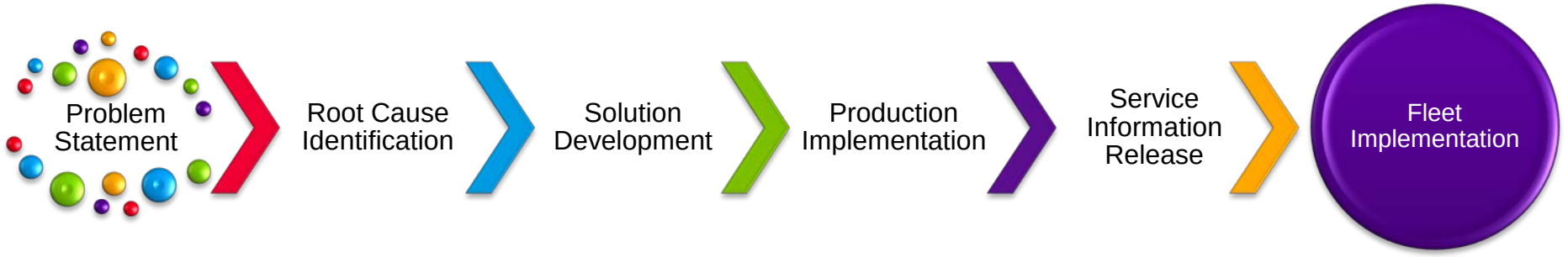
- Review/Approve Fleet Risk Management Plan
- Review/Approve Corrective Action

BCA In-Service Safety Process



Issue Resolution

Safety Solution



- Solution process led by Boeing, engages operators, the FAA, and suppliers
- Output of the process is production implementation and/or service information released to the affected fleet

Safety Lessons Learned

- Boeing uses the Boeing Problem Solving Model (BPSM) for development of Safety Lessons Learned

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Global Aerospace Safety

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Safety Experience at Boeing

Serve the global aerospace safety ecosystem

Global Aerospace Safety

Airline Operational Safety Support

Enhance pilot and maintainer competency

Increase global pilot presence

Safety Management System

Increase global safety & regulatory affairs presence

Operational Aspects of Design

An Integrated Approach to Strengthen Aerospace Safety

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Aerospace Safety Analytics

Delivering Insights for Predictive Action

Predict hazards to prevent accidents and improve fleet safety

Acquiring and Aggregating Data

Monitor safety performance across design, manufacturing, and global fleet operations

Data Analytics Enables SMS

Build on a standard industry approach to advance a more holistic and predictive Safety Management System (SMS)

Building Analytics Capability

Enable a culture of transparency and engineering excellence; improve product and services safety performance

Our mission is to prevent accidents, injury, or loss of life

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Safety Experience at Boeing

Serve the global aerospace safety ecosystem

Safety Experience at Boeing

- A global digital safety experience
- Scalable and intimate learning
- Drawing from history, accidents and design decisions

https://safetyexperience.boeing.com/

Advance Boeing's learning, safety culture through a digital experience