



# Serving the Global Aerospace Safety Ecosystem with a Proactive, Integrated Systems Approach



An OEM Perspective on Aircraft Accident and Incident Prevention

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Global Aviation System Safety

The Boeing Company

# Chief Aerospace Safety Office

## 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** Contents Introduction Approach & Governance People **Products & Services** Operations Communities Appendix

### 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.

“From information gathered through risk assessment processes to the issues and ideas employees bring forward, our Safety Management System relies on data. We’re taking an eyes-wide-open approach to how we use that data to continuously learn and improve — always with our sights set on safety.”

Mike Delaney, Chief Aerospace Safety Officer and Senior Vice President, Global Aerospace Safety

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.

2021 SUSTAINABILITY REPORT PRODUCTS & SERVICES 34

# Global Air Transportation System



Design → Build → Operation → Maintenance → Infrastructure → Regulation

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

# Safety Initiatives

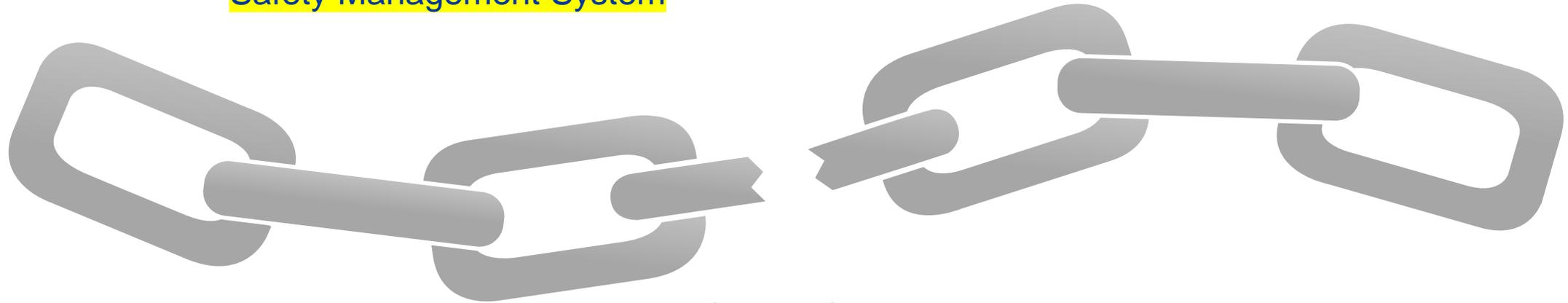
**Boeing Safety Practices & Culture**

Enhanced Oversight

Safety Management System

**Advanced Analytics**

Boeing Safety Intelligence



*Causal Chain*

**Operational Safety**

Global Aerospace Safety Initiative

**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

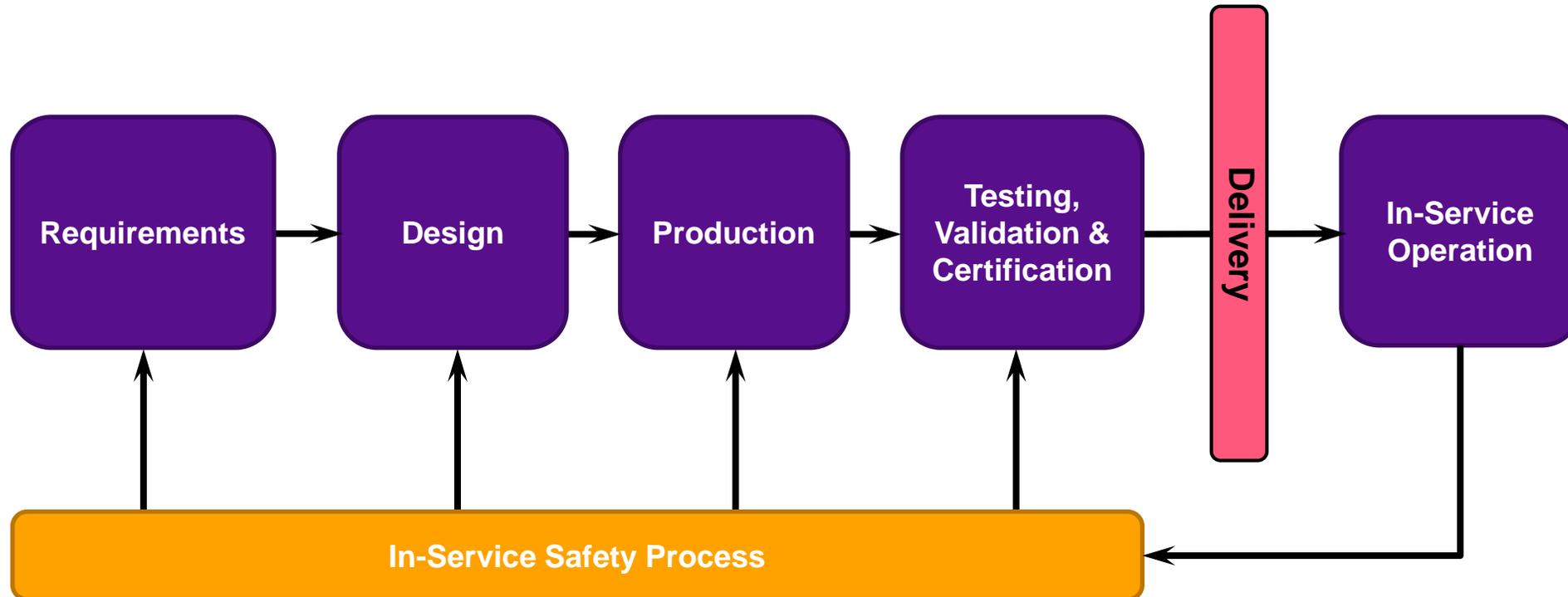
## **The In-Service Safety Process (ISSP) ensures the continued operational safety of the fleet throughout the product lifecycle:**

Continuous monitoring of product performance to identify potential safety issues

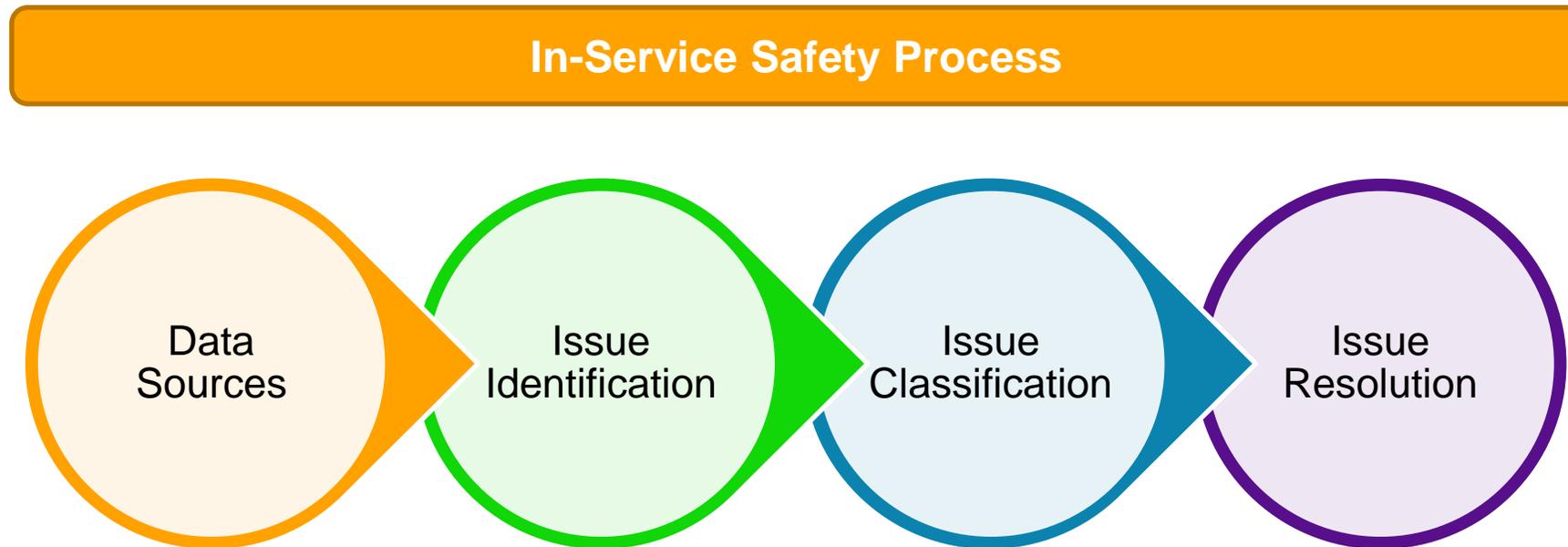
- Boeing ISSP develops recommended corrective actions to maintain or restore the airworthiness of the fleet
- Safety decisions and corrective actions may exceed regulatory standards
- FAA may mandate corrective actions via Airworthiness Directive

**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

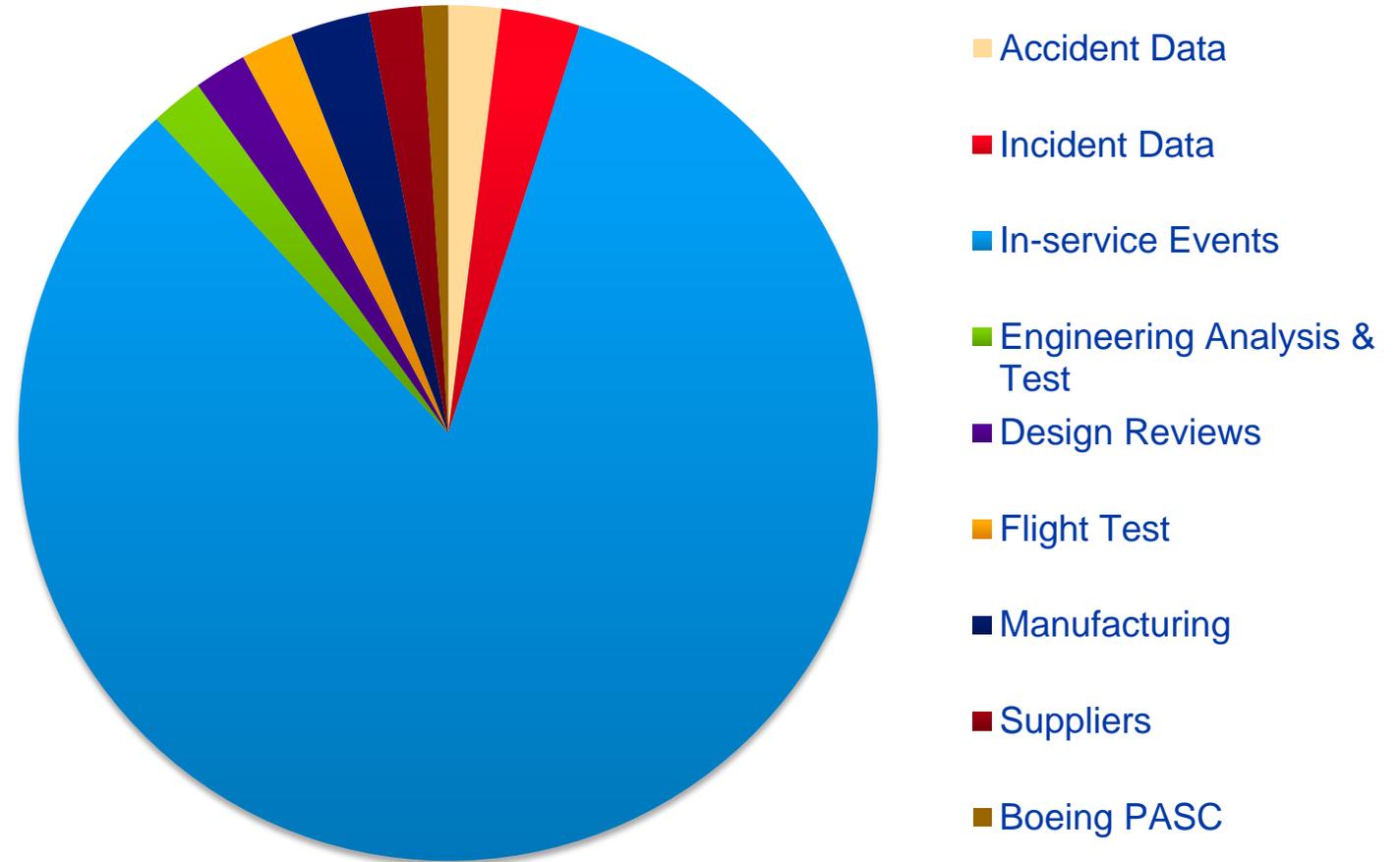


# BCA In-Service Safety Process

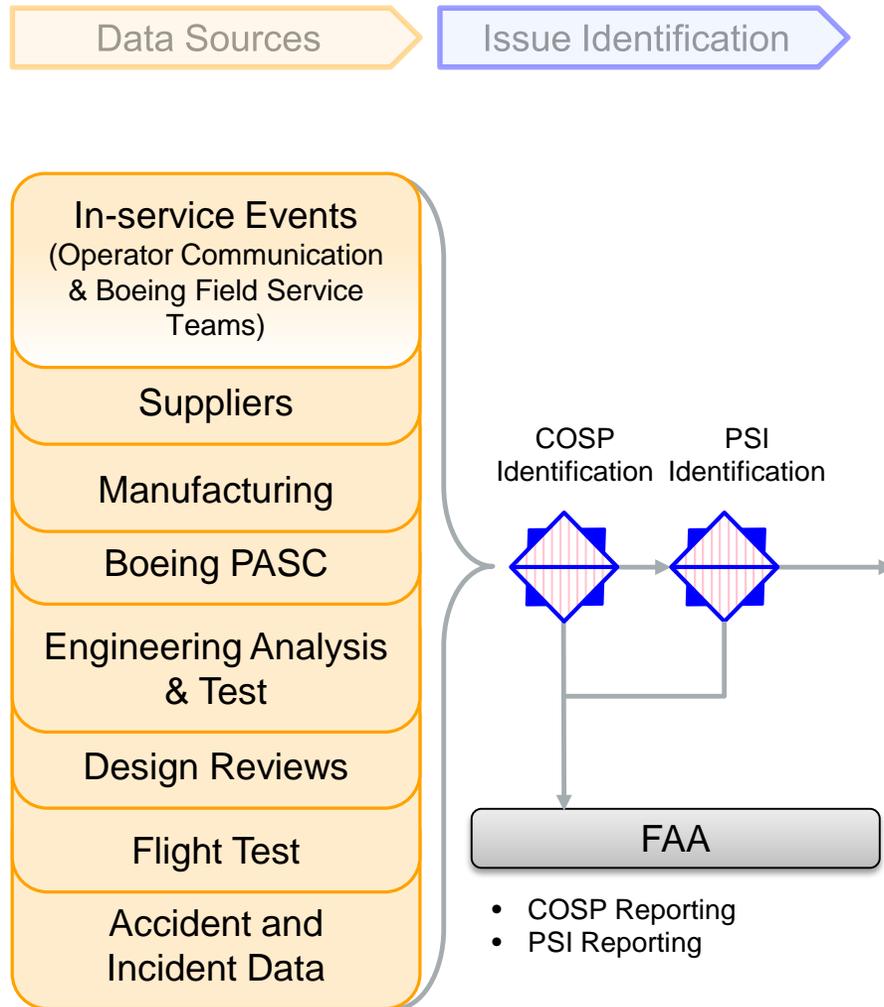
## Data Sources

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

## Approximate Data Source Distribution

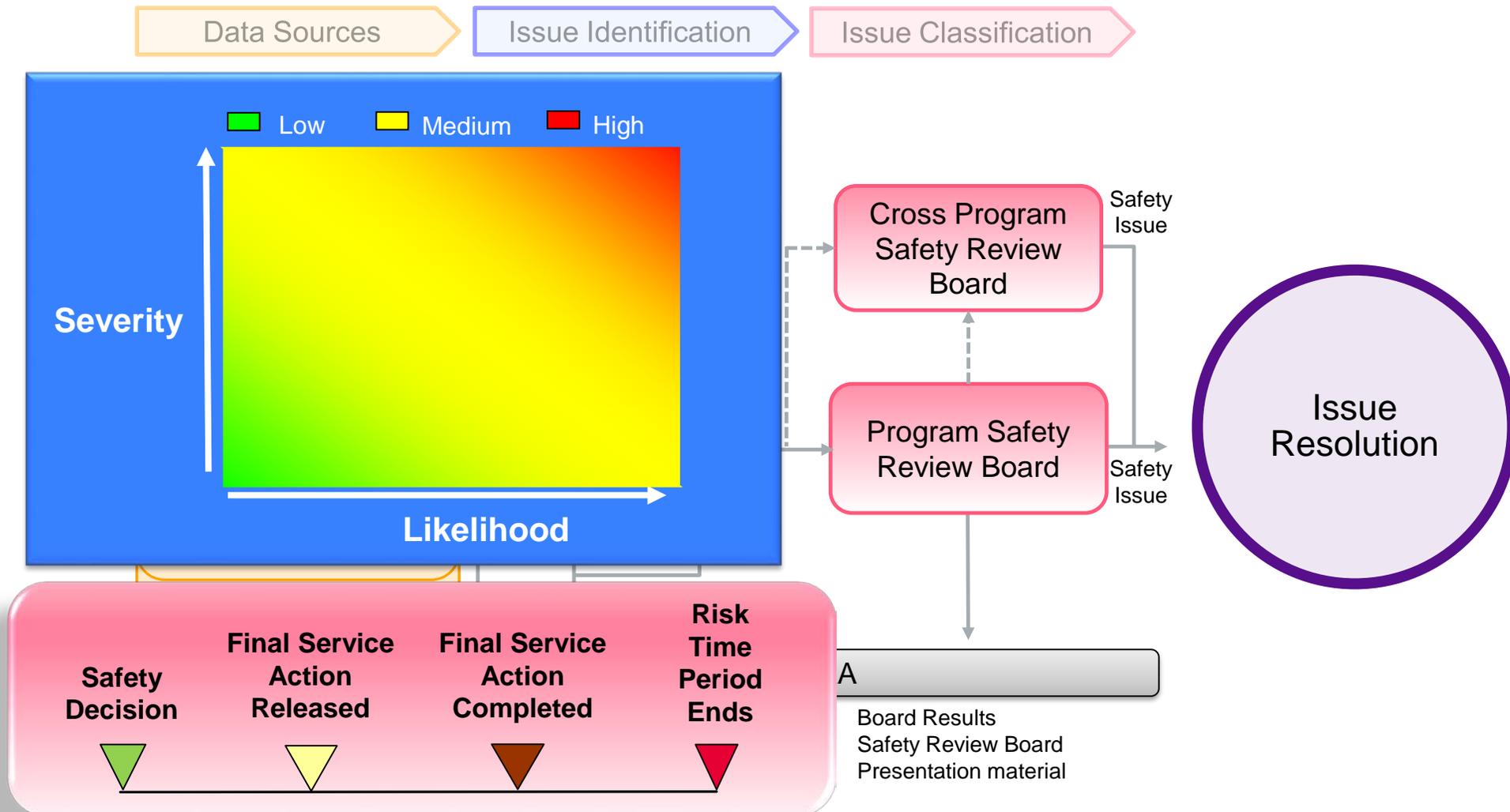


# BCA In-Service Safety Process

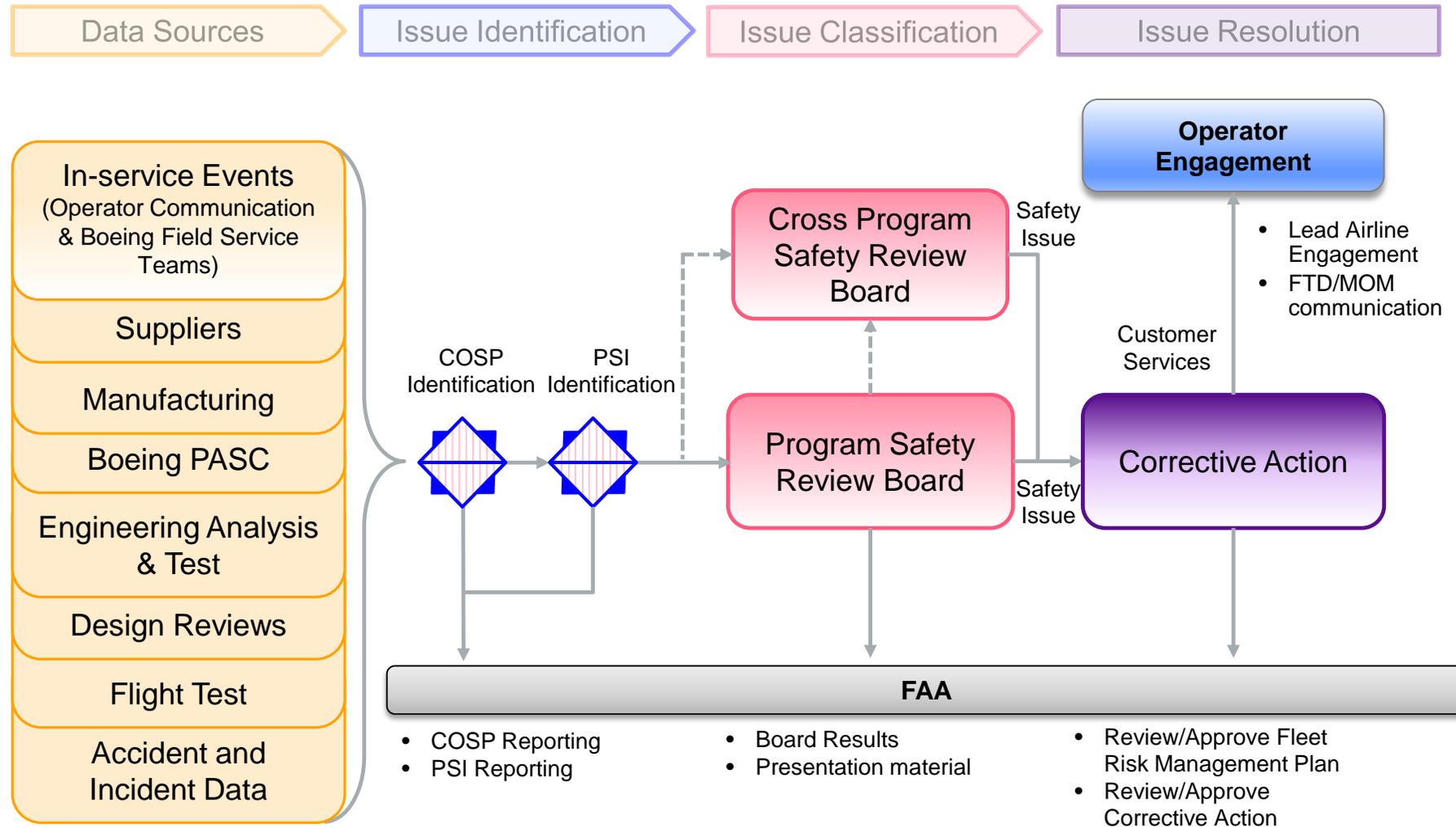


COSP Criteria	PSI Criteria
Satisfies and expands upon the reporting requirements in FAR 21.3	Identifies safety-significant events and conditions
Example: Any event that results in Engine, wing, or fuselage contact with the runway	Example: Any event that results in Engine, wing, or fuselage contact with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

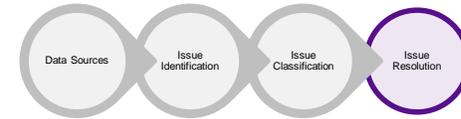
# BCA In-Service Safety Process



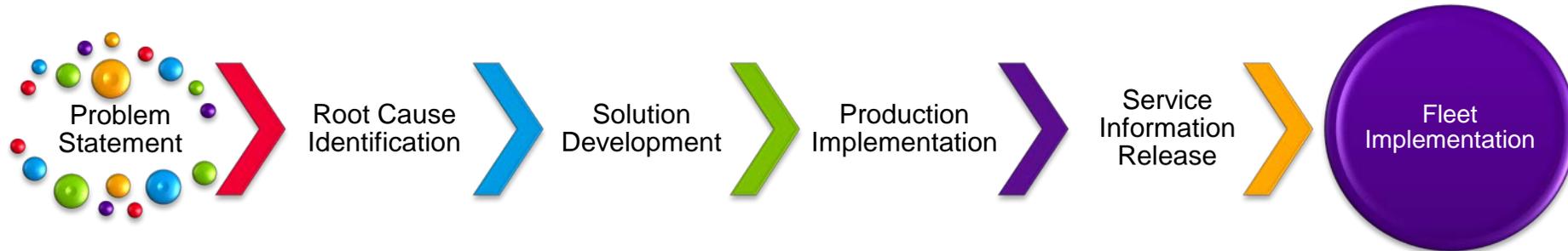
# BCA In-Service Safety Process



# BCA In-Service Safety Process



## Safety Solution



The solution process, led by Boeing, engages operators, the FAA, and suppliers

The output of the process is production implementation and/or service information released to the affected fleet

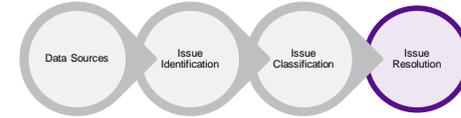
## Compliance Recommendation

The compliance time associated with recommended accomplishment time for operators in service actions (e.g. service bulletins)

Considerations include, but are not limited to, the following:

- Overall risk for the issue
- Complexity of the change and time needed for incorporation
- Operators maintenance schedules
- Time needed for develop and certify the solution

# BCA In-Service Safety Process



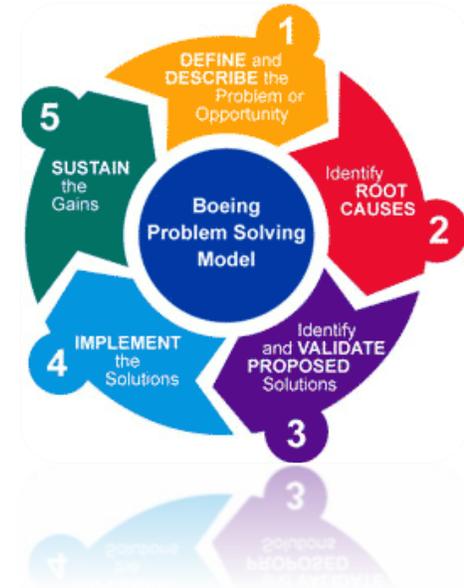
## Safety Lessons Learned

The process identifies what within the Boeing design or build system allowed the unsafe condition to develop, and modifies the system to prevent reoccurrence

- Provides a variety of root cause analysis tools
- Includes review of design guides, process documents, requirements

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

- Process provides a rigorous approach for determining actionable root causes and developing corrective actions



# Safety Initiatives

**Boeing Safety Practices & Culture**  
Enhanced Oversight  
Safety Management System

**Advanced Analytics**  
Boeing Safety Intelligence



*Causal Chain*

**Operational Safety**  
Global Aerospace Safety Initiative

**Transparency & Learning**  
Safety Experience at Boeing

**Serve the global aerospace safety ecosystem**

# Global Aerospace Safety Initiative

## Vision

- We will be industry leaders in global aerospace safety

## Mission

- We serve, integrate and champion aerospace safety through humility and inclusion for those who depend on, operate, build, train and maintain our products



# Boeing Global Aviation System Safety

## Aviation Safety

### Accident Prevention Initiatives

FAA CAST/JIMDAT Working Groups  
ASIAS Data Requirements and Analysis  
Regional Aviation Safety Groups (RASGs)  
Collaborative Safety Teams (CSTs)  
Safety R&D and Product Safety Enhancement  
Human Factors

## Regulatory Capability

### Enhance CAA Oversight

CAA Gap Assessment and Audit Preparations

- FAA IASA
- ICAO USOAP
- EU Safety List
- ICAO SSP-IA

Assistance with Corrective Action Plans

Training Coordination Assistance

## Regulatory Readiness

### Operator Regulatory Approvals

New Airplane Model Introductions  
FAR-129, ETOPS, Polar Ops, Network Security Programs  
Equipment Compliance  
Regulatory Engagement Facilitation



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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

- 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**

