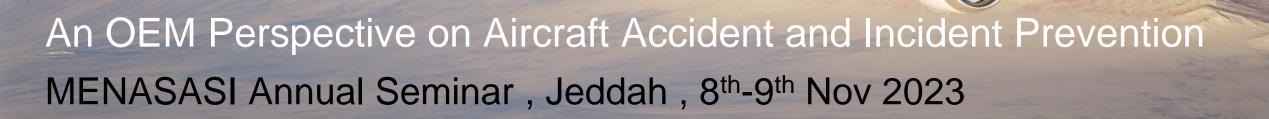


Serving the Global Aerospace Safety Ecosystem with a Proactive, Integrated Systems Approach



Ahsan Naseer, Manager Aviation Safety Strategy
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



Aerospace Safety and Quality

priority. We take seriously the responsibility enterprise Safety Management System, 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 Delanev, 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.

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 LEADING IN A RAPIDLY and personal. We know that protecting people starts with people. Foundational to SMS is a positive safety culture in which every with a growing range of global competitors, 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 eliminate root causes and prevent recurrence. finished product.

CHANGING WORLD

employee is empowered and encouraged to 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 problems using a structured methodology to of detecting and addressing problems in the

Operating in a rapidly changing environment



From information gathered through risk

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

2021 SUSTAINABILITY REPORT

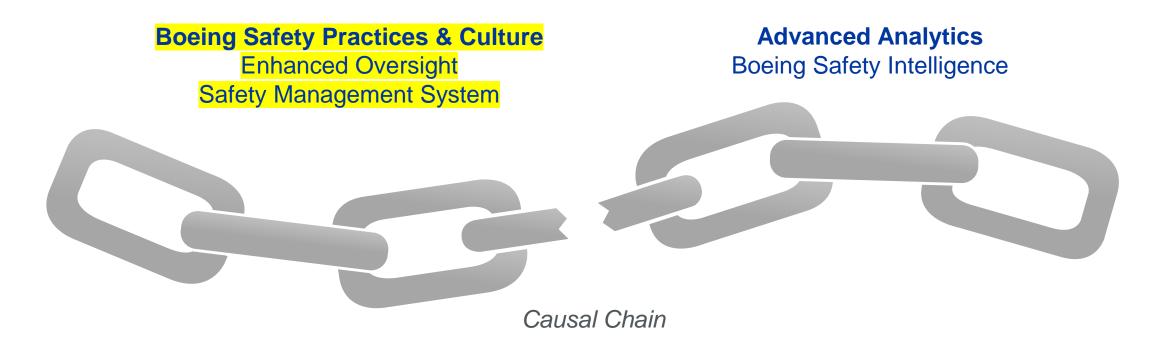
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Global Air Transportation System



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

Safety Initiatives



Operational Safety
Global Aerospace Safety Initiative

Transparency & LearningSafety Experience at Boeing

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

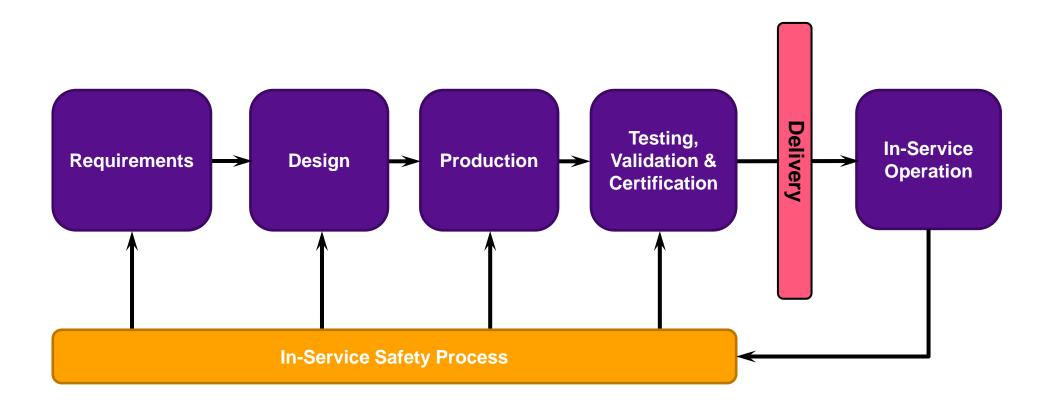
The In-Service Safety Process (ISSP) ensures the continued operational safety of the fleet throughout the product lifecycle:

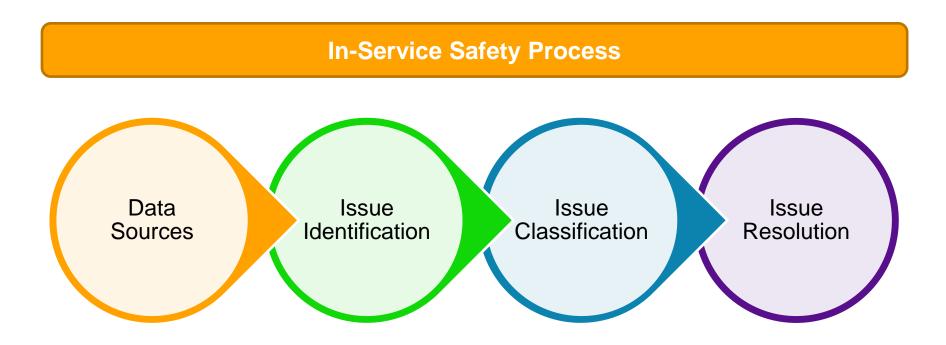
Continuous monitoring of product performance to identify potential safety issues

- 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





Data Sources

In-service Events
(Operator Communication
& Boeing Field Service
Teams)

Suppliers

Manufacturing

Boeing Speak Up

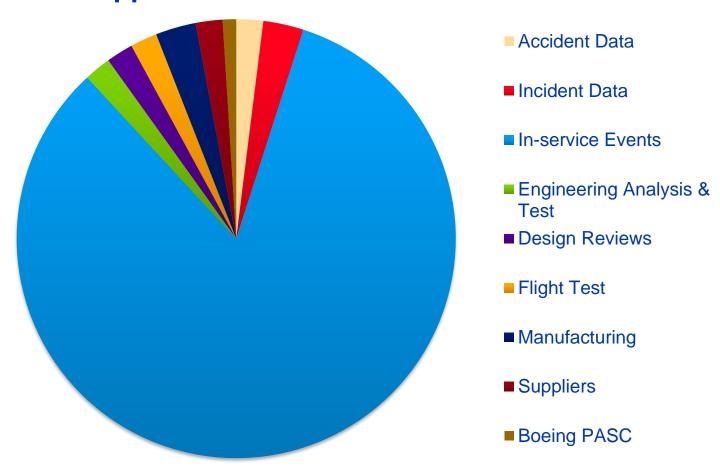
Engineering Analysis & Test

Design Reviews

Flight Test

Accident and Incident Data

Approximate Data Source Distribution



Data Sources

Issue Identification

In-service Events
(Operator Communication
& Boeing Field Service
Teams)

Suppliers

Manufacturing

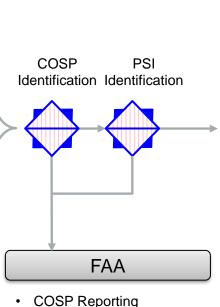
Boeing PASC

Engineering Analysis & Test

Design Reviews

Flight Test

Accident and Incident Data



PSI Reporting

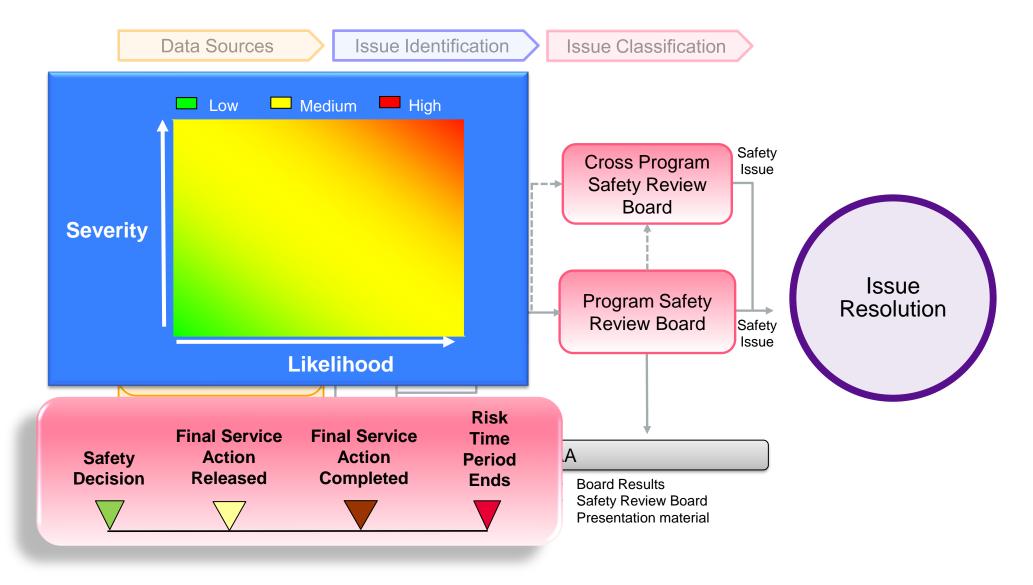
COSP Criteria Satisfies and expands upon the reporting requirements in FAR 21.3

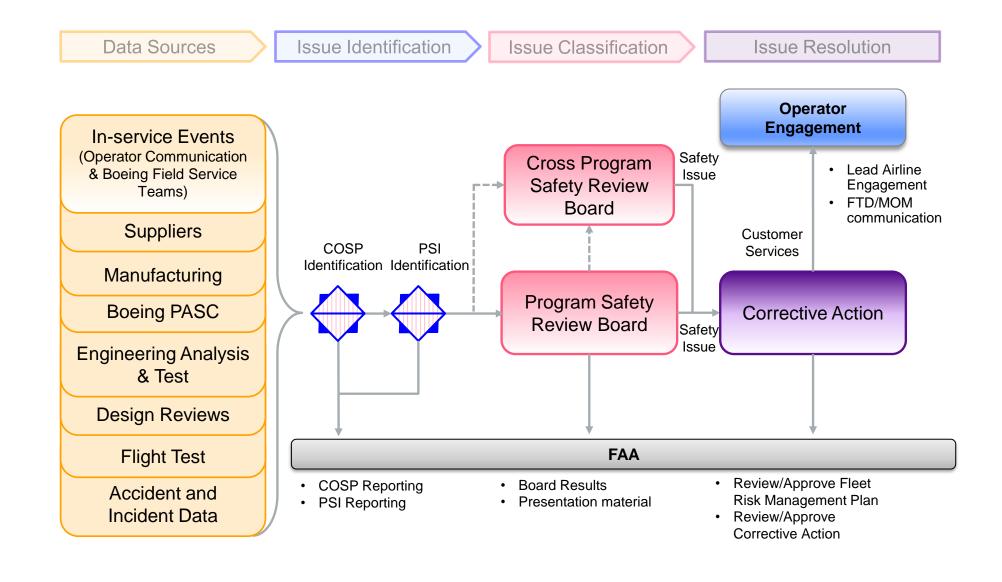
Example: Any event that results in Engine, wing, or fuselage contact with the runway

Identifies safetysignificant events and conditions

PSI Criteria

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.







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



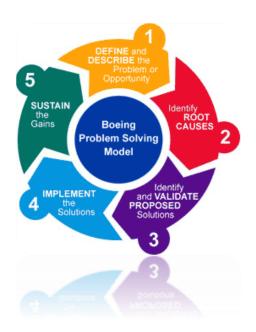
Safety Lessons Learned

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

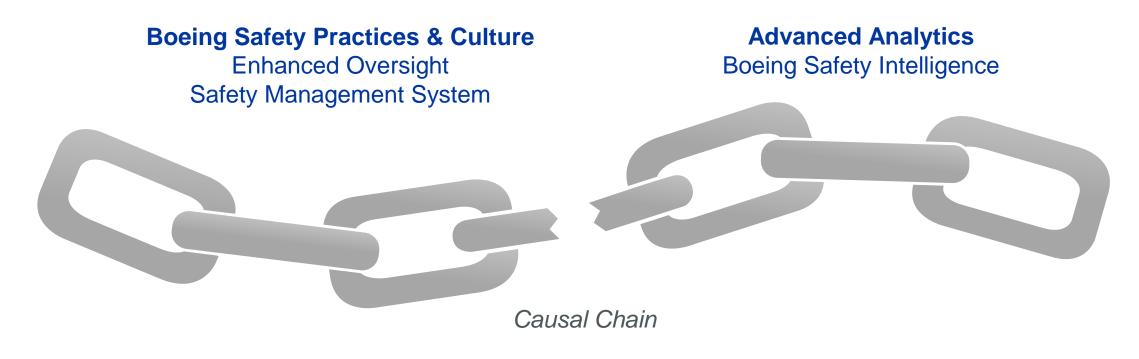
- Provides a variety of root cause analysis tools
- Includes review of design guides, process documents, requirements

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



Operational Safety
Global Aerospace Safety Initiative

Transparency & LearningSafety Experience at Boeing

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

Safety Management System

Establish an Enterprise SMS, connecting enterprise safety procedures and strengthening safety-first culture

Airline Operational Safety Support

Review airline safety operations and provide appropriate safety support for Flight Operations, Maintenance, and Engineering

Enhance pilot and maintainer competency

Reduce variability in pilot and maintainer performance and enhance overall operator safety by employing evidence based training programs, new digital solutions and monitoring safety

Increase global pilot presence

Establish stronger relationships with customers' flight operations/flight training, improve information flow, better understand how our products are being operated, influence safety practices, develop predictive analytics capability

Increase global safety & regulatory affairs presence

Increase global safety and regulatory affairs presence and engagement with international regulators and stakeholders

Operational Aspects of Design

Strengthen tools and processes to synthesize operational data and inform engineering and design

Integrated Product Team providing safety, mission success, strategic direction, and leadership oversight

Boeing Global Aviation System Safety

Aviation Safety

<u>Accident Prevention</u> <u>Initiatives</u>

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

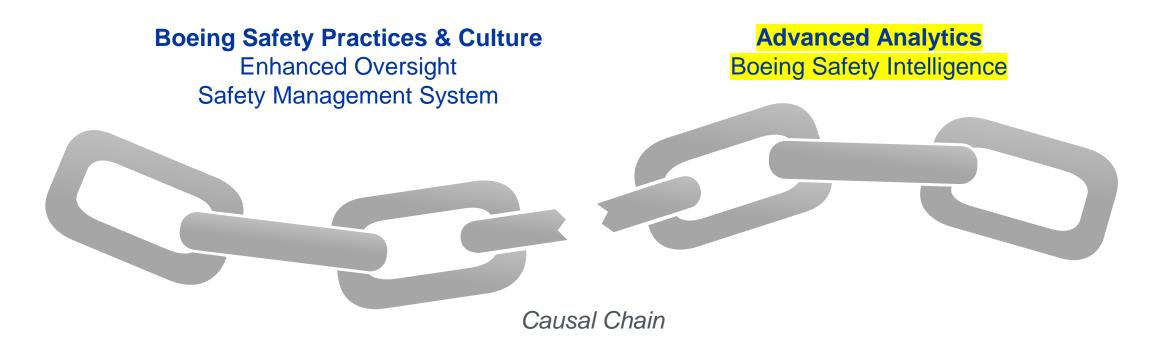
Equipment Compliance

Regulatory Engagement Facilitation



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Safety Initiatives



Operational SafetyGlobal Aerospace Safety Initiative

Transparency & LearningSafety Experience at Boeing

Aerospace Safety Analytics



Predict hazards to prevent accidents and improve fleet safety



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



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

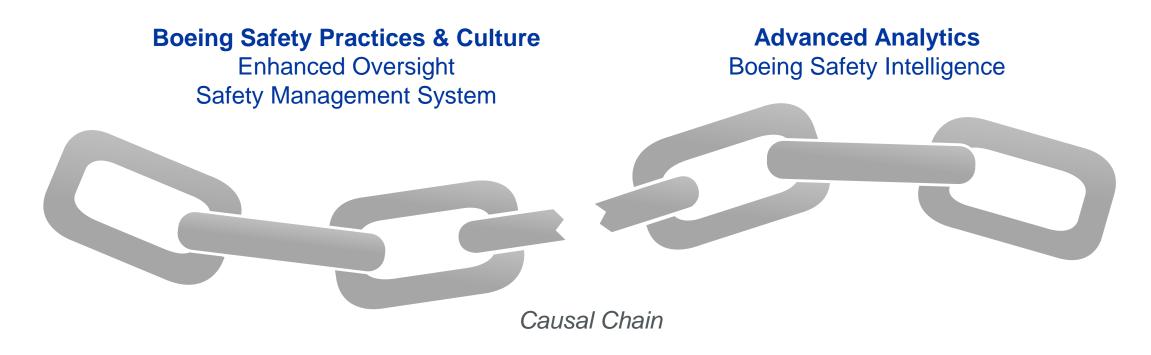


Enable a culture of transparency and engineering excellence; improve product and services safety performance

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

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Safety Initiatives



Operational Safety
Global Aerospace Safety Initiative

Transparency & Learning
Safety Experience at Boeing

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

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