Supersonic Flight Resumption Over the Continental U.S.: Safety Program Management Challenges for Airports and Airspace Integration in an SMS Framework

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Researcher Albert N. Clark

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Supersonic Flight Resumption Over the Continental U.S.: Safety Program Management Challenges for Airports and Airspace Integration in an SMS Framework

Albert N. Clark

This Graduate Capstone Project
was prepared with the guidance of the candidate's Research Sponsor,
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Master of Aviation Science

_____
Professor Mike Dausel.
Research Sponsor

_____
Chris Bellamy
Aviation Department Chair

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Section One

Introduction

Research Area of Concentration

The resumption of civil supersonic flight over the continental United States represents a major evolution in commercial aviation. Following the House passage of the Supersonic Aviation Modernization Act (H.R. 3410) in March 2026, the long-standing 1973 ban on overland supersonic operations is being replaced with noise-based standards enabled by quiet-boom technologies such as NASA's X-59 QueSST aircraft and Boom Supersonic's Overture (Federal Aviation Administration, 1973/updated; Nehls, 2026). These advancements promise significantly reduced transcontinental travel times but introduce new operational complexities for airports and Air Navigation Service Providers (ANSPs).

Table 1. Alignment of SMS Pillars with Supersonic Integration Challenges

SMS Pillar	Supersonic Integration Challenges	Recommended SMS Enhancements / Actions
Safety Policy	Lack of specific policy language addressing supersonic operations, sonic boom management, and high-speed flight procedures.	Update airport Safety Policy to explicitly include supersonic aircraft operations, low-boom noise management, and community impact considerations. Establish clear leadership accountability for supersonic safety integration.
Safety Risk Management	New and poorly understood hazards including sonic "thumps," modified high-speed arrival/departure profiles, increased airspace complexity, unique ground handling requirements, and wake turbulence characteristics.	Conduct supersonic-specific hazard identification and risk assessments. Develop new risk matrices that account for community response and noise-related operational constraints. Update SRM processes for ramp, runway, and airspace operations.
Safety Assurance	Inadequate monitoring systems for sonic boom impacts, limited data on community complaints as safety indicators, and insufficient auditing of new high-speed procedures.	Implement enhanced Safety Assurance monitoring, including real-time sonic boom tracking and community feedback as leading indicators. Conduct regular audits of supersonic procedures and integrate findings into continuous improvement processes.
Safety Promotion	Limited organizational and community awareness of supersonic-specific risks, training gaps for personnel, and potential erosion of trust due to public reaction to sonic booms.	Develop targeted training programs for airport and ANSP personnel on supersonic operations. Create proactive community engagement and education programs to build understanding and acceptance of low-boom signatures. Strengthen just culture messaging to encourage reporting of emerging supersonic-related hazards.

This capstone examines the safety program management challenges associated with integrating supersonic aircraft into existing airport and airspace operations within a Safety Management System (SMS) framework. Key areas include updating Safety Risk Management (SRM) processes, noise and sonic boom mitigation strategies, airspace redesign, and the development of a next-generation safety culture capable of supporting high-speed, low-boom operations.

Problem/Purpose Statement

Although quiet-boom technology and the Supersonic Aviation Modernization Act have removed the primary regulatory barrier to overland supersonic flight, airports and ANSPs face substantial safety program management challenges in integrating these aircraft into the National Airspace System (NAS). Current SMS frameworks at certificated airports (FAA Part 139) were not designed for the unique hazards of routine supersonic operations, including altered noise profiles, modified arrival/departure procedures, increased airspace complexity, and the need for proactive community engagement regarding sonic "thumps" (National Academies of Sciences, Engineering, and Medicine, 2009; Loubeau & Page, 2018).

Without targeted updates to Safety Risk Management, Safety Assurance, and safety promotion elements of SMS, airports risk gaps in hazard identification, risk assessment, and mitigation—particularly in areas such as ramp operations, runway safety, noise monitoring, and emergency response planning. Historical data from Concorde operations and recent low-boom flight testing highlight that even reduced sonic booms can generate public concern and operational friction if not proactively managed through robust SMS processes (Sparrow et al., 2019; Fidell & Horonjeff, 2019).

The purpose of this capstone is to identify and analyze the specific safety program

management challenges airports and ANSPs must address to safely integrate supersonic flight resumption. By evaluating current SMS requirements against the demands of next-generation supersonic operations, this project aims to provide practical recommendations for regulatory compliance, risk mitigation, and the cultivation of a proactive safety culture. This research is motivated by the urgent need to ensure that technological and legislative progress does not outpace safety program readiness, thereby protecting passengers, airport personnel, communities, and the integrity of the NAS (Adjekum, 2014; Stroeve et al., 2022).

Section Two

Literature Review/Annotated Bibliography

Introduction of Annotated Bibliography

An annotated bibliography provides a concise summary, critical assessment, and reflection on each source, demonstrating how the literature supports the research topic. This annotated bibliography includes at least one entry aligned with each of the program's educational outcomes. These sources were selected for their direct relevance to safety program management, SMS implementation, and supersonic flight integration challenges at airports and in airspace operations.

Area of Concentration.

Nehls, T. (2026, March 24). *House passes Nehls' bill to allow supersonic flight over the United States* [Press release]. Office of Congressman Troy Nehls. http://nehls.house.gov/media/press-releases/house-passes-nehls-bill-allow-supersonic-flight-over-united-states

Summary. This press release details the passage of H.R. 3410, the Supersonic Aviation Modernization Act, which directs the FAA to revise regulations and replace the 1973 overland ban with performance-based noise standards, enabling commercial supersonic operations.

Assessment. Authoritative primary source from the bill's sponsor; provides current legislative context and explicit linkage to safety and regulatory modernization.

Reflection. This source is foundational to my area of concentration as it establishes the policy trigger for the SMS challenges this capstone examines, underscoring the

immediate need for airports and ANSPs to update safety program management practices.

Transportation. Boom Supersonic. (2025). Up to speed: May. Boom Supersonic. https://boomsupersonic.com/flyby/up-to-speed-may-2025

Summary. The update discusses how the Supersonic Aviation Modernization Act will unlock direct overland routes for the Overture aircraft, highlighting transportation trends toward faster domestic connectivity while noting the need for airports to prepare infrastructure and operational procedures.

Assessment. Timely industry perspective that connects legislative change to practical transportation implications and operational readiness.

Reflection. This source illustrates current aviation transportation trends and the pressure on airports to evolve SMS frameworks to accommodate supersonic resurgence.

Trends. Fortune Business Insights. (2025). Supersonic jet market size, share & growth report [2026-2034]. https://www.fortunebusinessinsights.com/supersonic-jet-market-105715.

Summary. This market analysis details current and projected trends in the supersonic jet sector, including rapid market expansion (from USD 31.4 billion in 2026 to USD 45.6 billion by 2034), North American dominance, and the impact of recent regulatory changes enabling overland operations on airports and airspace infrastructure.

Assessment. Reputable industry research report with data-driven forecasts and clear linkage to operational trends affecting commercial aviation.

Reflection. This source supports the trends educational outcome by illustrating how accelerating market and regulatory developments in supersonic flight are creating urgent demands for airports and ANSPs to update SMS frameworks for safe, scalable integration.

Security. NASA. (2026). NASA's X-59 flight tests pick up speed. NASA Quesst Mission. https://www.nasa.gov/blogs/quesst/2026/05/08/nasas-x-59-flight-tests-pick-up-speed-with-two-flight-days/

Summary. This report covers ongoing X-59 flight testing and data collection on low-boom signatures, emphasizing human factors such as community response to sonic thumps and the importance of integrating these findings into safety and noise mitigation planning.

Assessment. Highly credible government research source with real-time operational data directly applicable to human factors and safety risk assessment.

Reflection. Critical for the security and human factors outcome, as it demonstrates how subjective community perception of sonic booms must inform SMS hazard identification and risk controls at airports.

Human Factors. Loubeau, A., & Page, J. (2018). Human perception of sonic booms from supersonic aircraft. Acoustics Today, 14(2), 23-30

Summary. This article reviews research on how people perceive and respond to sonic booms, including laboratory studies and the factors that influence annoyance, startle response, and acceptability of low-boom signatures from next-generation supersonic aircraft.

Assessment. Authoritative review by leading acoustics and human factors researchers with direct relevance to NASA's X-59 community testing program.

Reflection. This source is essential for the human factors educational outcome because it highlights the importance of understanding public and operational human response to sonic booms when developing safety management protocols and community engagement strategies for supersonic operations at airports and ANSPs

Communication. Federal Aviation Administration. (2023/updated). Airport safety management system (Final rule, 14 CFR Part 139). Federal Register. https://www.federalregister.gov/documents/2023/02/23/2023-03597/airport-safety-management-system

Summary. This rule mandates SMS implementation at qualifying airports and outlines the four pillars (Safety Policy, Risk Management, Assurance, and Promotion) required for proactive hazard management in evolving operational environments.

Assessment. Official FAA regulatory document with clear guidance on SMS scalability; directly relevant to technology-enabled integration of new aircraft types.

Reflection. This source supports the communication and technology outcome by showing how airports must leverage SMS processes and emerging technologies to communicate risks, update procedures, and foster a robust safety culture for supersonic operations.

Technology. Lockheed Martin. (2025, October 28). X-59 soars: A new era in supersonic flight begins. Lockheed Martin. https://news.lockheedmartin.com/2025-10-28-X-59-Soars-A-New-Era-in-Supersonic-Flight-Begins

Summary. This release details the successful first flight of the X-59 and the advanced aerodynamics and low-boom technologies that minimize sonic booms, enabling new FAA noise standards for overland supersonic operations.

Assessment. Authoritative technical update from NASA's industry partner with specific details on low-boom design innovations.

Reflection. This source supports the technology educational outcome by demonstrating how cutting-edge aircraft design and engineering advancements must be incorporated into airport and airspace SMS frameworks for safe integration of supersonic flight.

Section Three – Research of Educational Outcomes

Introduction to Educational Outcomes

The Master of Aviation Science program at Everglades University structures its educational outcomes around key domains that equip graduates to address complex challenges in modern aviation. These outcomes—Area of Concentration, Transportation, Trends, Security, Human Factors, Communication, and Technology—provide a comprehensive framework for analyzing contemporary issues through a safety-focused lens. In this capstone, Section Three applies each outcome directly to the resumption of civil supersonic flight over the continental United States, with particular emphasis on the safety program management challenges facing airports and Air Navigation Service Providers (ANSPs) under a Safety Management System (SMS) framework (Federal Aviation Administration, 2023; International Civil Aviation Organization, 2016). By examining supersonic integration through these structured lenses, this section bridges theoretical program outcomes with practical application, identifying specific gaps in current SMS implementation and offering targeted recommendations for proactive risk mitigation, regulatory compliance, and operational readiness. This analysis builds upon the foundational context established in Section One and the supporting literature in Section Two.

Figure 1. Safety Management System (SMS) Framework Applied to Supersonic Aircraft Integration

Area of Concentration

The core area of concentration for this capstone is safety program management challenges associated with integrating supersonic aircraft into existing airport and airspace operations within an SMS framework. The resumption of overland supersonic flight, enabled by the Supersonic Aviation Modernization Act (H.R. 3410) and quiet-boom technologies such as NASA's X-59 QueSST, introduces novel operational hazards that exceed the design parameters of current FAA Part 139 SMS requirements at certificated airports (Nehls, 2026; National Academies of Sciences, Engineering, and Medicine, 2009).

Key challenges include updating Safety Risk Management (SRM) processes to account for unique supersonic characteristics such as altered noise profiles ("sonic thumps"), modified high-speed arrival and departure procedures, increased airspace complexity, and the need for enhanced community engagement. Traditional SMS tools—hazard identification, risk assessment matrices, and mitigation strategies—must be expanded to address these dynamic elements (Adjekum, 2014; Malakis et al., 2023). For instance, ramp and runway safety protocols may require revision to accommodate higher thrust profiles and unique ground handling characteristics of supersonic aircraft, while noise monitoring systems must evolve beyond subsonic standards to incorporate real-time sonic boom data.

Without targeted enhancements to the four pillars of SMS (Safety Policy, Safety Risk Management, Safety Assurance, and Safety Promotion), airports risk systemic gaps that could compromise safety, regulatory compliance, and public acceptance (Stroeve et al., 2022). This capstone argues that a robust, forward-looking SMS framework is essential to ensure that technological and legislative advancements in supersonic flight do not outpace safety program readiness. Practical recommendations include the development of supersonic-specific safety

risk assessments, updated emergency response plans, and the cultivation of a just culture that encourages reporting of emerging hazards during the transition period.

Transportation

Transportation is a core educational outcome that highlights the operational and infrastructural implications of resuming supersonic flight over the continental United States. The ability to significantly reduce transcontinental travel times through direct overland supersonic routes will reshape domestic air transportation networks, placing new demands on airport capacity, gate availability, runway utilization, and ground support operations.

Within an SMS framework, these changes introduce specific safety program management challenges. Airports must update Safety Risk Management (SRM) processes to evaluate increased traffic density, potential conflicts between supersonic and subsonic operations, and revised taxiway and ramp procedures for aircraft with different performance characteristics (Federal Aviation Administration, 2023). Ground transportation integration—such as passenger movement, cargo handling, and emergency vehicle response—must also be reassessed to maintain safety margins during high-speed turnaround operations.

This outcome underscores the need for airports and ANSPs to conduct comprehensive operational risk assessments that account for supersonic-

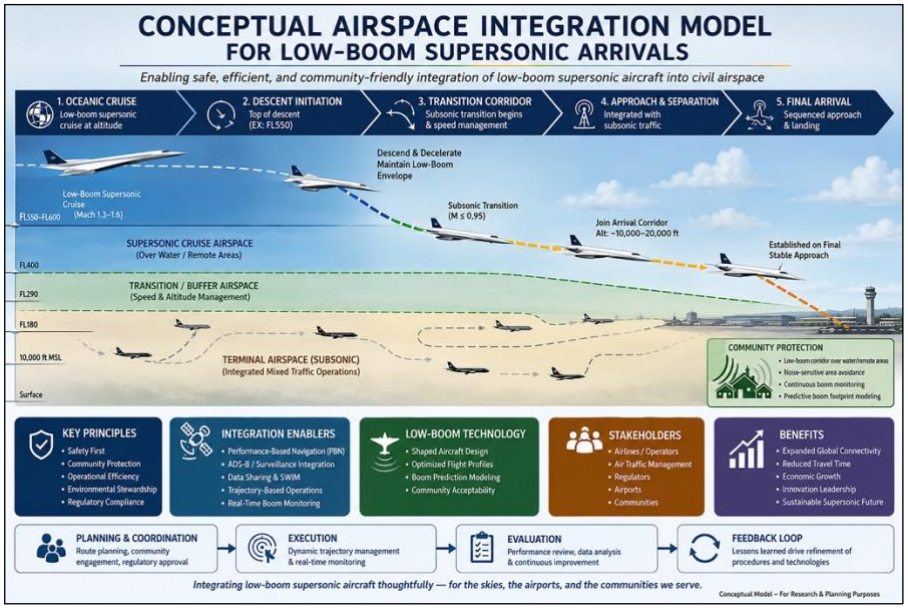

Figure 2. Conceptual Airspace Integration Model for Low-Boom Supersonic Arrivals

specific factors like higher thrust requirements during takeoff and unique wake turbulence profiles. In addition, practical recommendations include the development of dedicated supersonic corridors or time-slot management strategies, coupled with enhanced Safety Assurance monitoring to ensure that expanded transportation capabilities do not compromise existing safety performance indicators (Adjekum, 2014).

Trends

Trends in the aviation industry provide essential context for understanding the broader environment in which supersonic operations will resume. Market analyses project substantial growth in the supersonic sector, driven by regulatory modernization and advancing quiet-boom technology (Fortune Business Insights, 2025). These trends create both opportunities and pressures for airports and ANSPs to adapt their safety programs rapidly.

Current market forecasts indicate strong North American demand and accelerated development timelines, which will require SMS frameworks to evolve from reactive to highly anticipatory models. Safety program management must address emerging trends such as increasing privatization of supersonic services, integration of new business models, and the convergence of commercial and space-adjacent technologies. Hazard identification processes need to incorporate trend analysis tools to anticipate future risks rather than relying solely on historical subsonic data (Malakis et al., 2023).

For this capstone, the trends outcome emphasizes the importance of Safety Promotion activities that prepare organizations for continuous change. Airports should establish formal trend monitoring programs within their SMS to track regulatory updates, technological advancements, and market shifts (Stroeve et al., 2022).

Security

Security considerations form a vital educational outcome when examining the integration of supersonic aircraft into the National Airspace System. The introduction of high-value, high-speed supersonic operations elevates the importance of protecting aircraft, passengers, critical infrastructure, and sensitive operational data.

In an SMS context, security challenges intersect with safety through the need for integrated risk management. Supersonic aircraft may present new vulnerabilities, including cybersecurity risks associated with advanced avionics and digital flight control systems, as well as physical security concerns related to unique ground handling requirements at airports (Adjekum, 2014). Current SMS frameworks must be expanded to include robust threat and vulnerability assessments that address both traditional aviation security and emerging digital threats.

This outcome highlights the value of coordinated Safety and Security Management Systems (SeMS) interfaces. Recommendations include updating emergency response and contingency planning to account for supersonic-specific scenarios, enhancing access control for supersonic-capable ramps and facilities, and incorporating security considerations into regular SMS safety risk assessments. By treating security as an integrated component of comprehensive safety program management, airports and ANSPs can better protect the integrity of supersonic operations while maintaining public confidence.

Human Factors

Human factors represent a critical educational outcome with direct implications for supersonic flight integration. Public and operational perception of sonic booms remains one of

the most significant non-technical barriers to routine overland operations. Even with low-boom designs, community annoyance, startle responses, and acceptability issues can generate operational friction, complaints, and resistance that airports and ANSPs must manage proactively through SMS processes (Loubeau & Page, 2018; Fidell & Horonjeff, 2019).

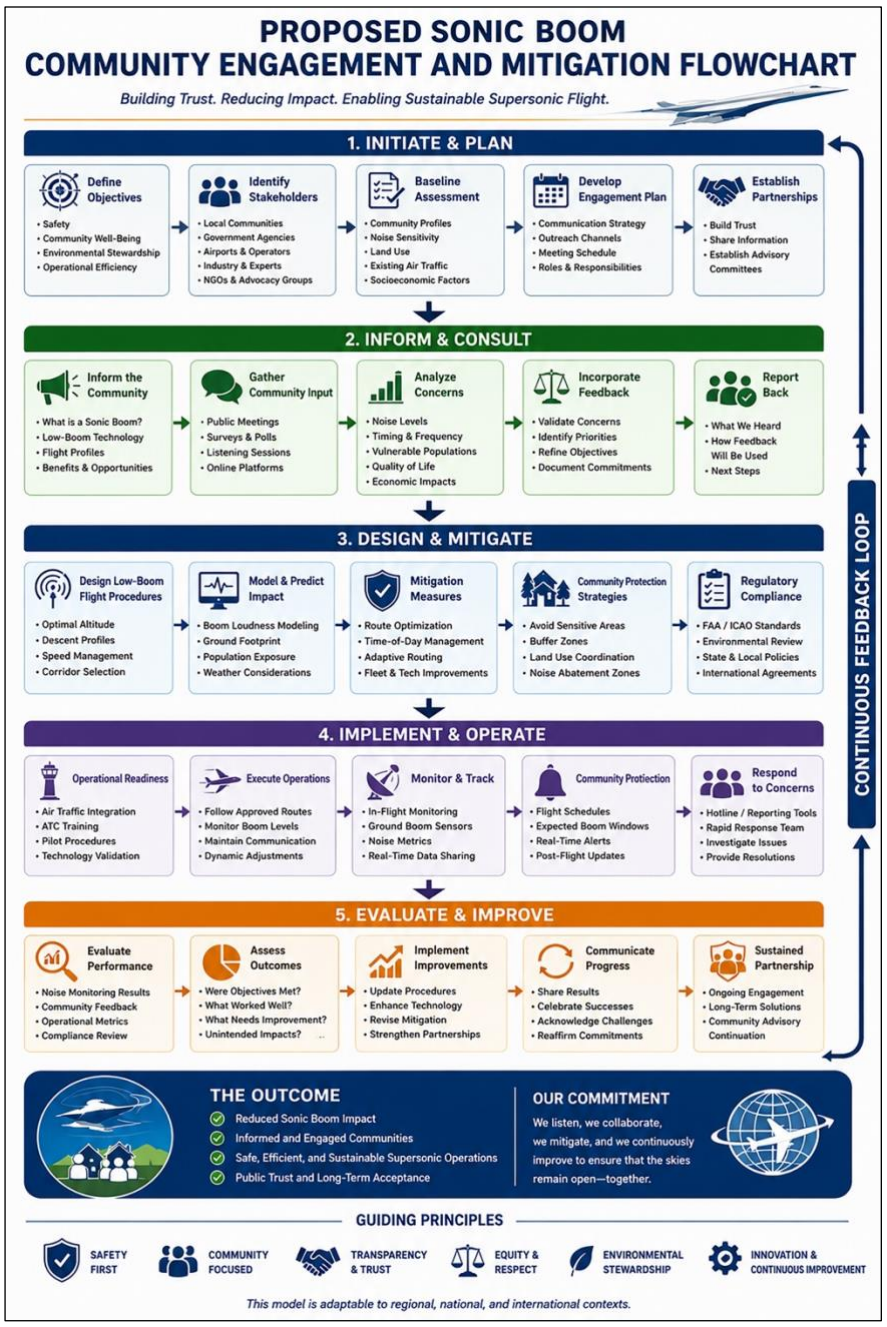

Figure 3. Proposed Sonic Boom Community Engagement and Mitigation Flowchart

Drawing from research on sonic boom perception, human factors considerations extend beyond passengers and crew to include air traffic controllers managing high-speed transitions, ground personnel handling unique aircraft characteristics, and residents in overflight corridors. Effective SMS implementation requires robust safety promotion activities—such as targeted education campaigns and transparent communication about expected "thump" signatures—to

build trust and reduce startle-induced human performance issues. Hazard identification processes must incorporate human factors analysis (e.g., using tools like SHEL or HFACS) to anticipate errors stemming from unfamiliar supersonic procedures (Malakis et al., 2023).

For airports, this outcome highlights the need to integrate community feedback loops into Safety Assurance monitoring and to develop training programs that prepare personnel for the psychological and physiological demands of supersonic operations. Addressing human factors effectively will be essential for achieving broad acceptance and maintaining a strong safety culture during the transition to routine supersonic flights (Stroeve et al., 2022).

Communication

Effective communication is fundamental to building and sustaining a strong safety culture, particularly during the complex transition to routine supersonic flight. This educational outcome focuses on the critical role of internal and external stakeholder engagement in supporting SMS implementation.

Airports and ANSPs must develop comprehensive communication strategies to address community concerns about sonic booms, coordinate with air traffic control on new procedures, and ensure clear safety messaging to flight crews, ground personnel, and regulators. Poor communication can undermine hazard reporting, erode trust, and weaken Safety Promotion efforts within the SMS framework (Adjekum, 2014).

Key challenges include managing public perception of “sonic thumps,” disseminating updated operational protocols, and fostering transparent dialogue with local communities and oversight agencies. This capstone recommends the establishment of structured communication protocols within SMS Safety Policy and Promotion pillars, including regular stakeholder briefings, digital information platforms, and feedback mechanisms. Strong, proactive

communication will be essential for achieving regulatory compliance, operational acceptance, and the development of a just culture that supports continuous safety improvement during supersonic integration (Stroeve et al., 2022).

Technology

Technology is a foundational educational outcome that directly underpins the feasibility and safety of supersonic resumption. Advances such as NASA's X-59 QueSST aircraft, Boom

Table 2. Recommended 24-Month Phased Implementation Timeline

Phase	Timeframe	Key Activities	Primary SMS Focus	Key Deliverables / Milestones
Phase 1: Foundation & Assessment	Months 1–6	Conduct comprehensive gap analysis of existing SMS against supersonic hazards; establish Supersonic Integration Working Group; perform initial hazard identification for sonic booms, high-speed procedures, and airspace changes.	Safety Policy & Safety Risk Management	Completed SMS Gap Analysis Report; Formation of Working Group; Initial Hazard Register
Phase 2: Development & Training	Months 7–12	Develop supersonic-specific risk assessment tools and procedures; design and deliver targeted SMS training for airport, ANSP, and airline personnel; create community engagement and communication plans.	Safety Risk Management & Safety Promotion	Supersonic SRM Toolkit; Training Curriculum & Delivery; Community Engagement Strategy
Phase 3: Pilot Implementation & Testing	Months 13–18	Conduct controlled pilot operations with selected supersonic aircraft; implement enhanced noise and community complaint monitoring; test new procedures and emergency response plans.	Safety Assurance & Safety Risk Management	Pilot Operations Report; Validated Procedures; Updated Emergency Response Plans
Phase 4: Full Integration & Continuous Improvement	Months 19–24	Roll out full supersonic operations; integrate leading and lagging safety performance indicators into regular SMS reviews; conduct after-action reviews and continuous improvement cycles.	All Four SMS Pillars	Fully Integrated Supersonic SMS; Performance Monitoring Dashboard; Final Lessons Learned Report

Supersonic's Overture design features, and supporting airspace management tools (e.g., enhanced surveillance, digital twins, and AI-assisted conflict prediction) offer powerful capabilities for mitigating risks. However, integrating these technologies into legacy airport

and NAS infrastructure presents substantial SMS challenges.

Current SMS frameworks must evolve to incorporate technology-specific risk assessments, including validation of new low-boom monitoring systems, compatibility of digital communication platforms with supersonic speeds, and cybersecurity considerations for increasingly automated airspace management. Airports will need to update Safety Risk Management processes to evaluate the introduction of these technologies, ensuring they enhance rather than complicate existing operations.

This outcome emphasizes the importance of Safety Assurance activities such as regular system testing, performance monitoring, and continuous improvement loops. Recommendations include collaborative technology integration pilots between airports,

Table 3. Example Leading and Lagging Safety Performance Indicators for Supersonic Operations

Safety Performance Indicator	Type	Description / Metric	Relevance to Supersonic SMS Integration
Percentage of personnel completing supersonic-specific SMS training	**Leading**	% of airport and ANSP staff who have completed required supersonic operations training within the required timeframe	Ensures workforce readiness before routine operations begin
Number of community sonic boom reports received per month	**Leading**	Monthly count of public reports/complaints regarding sonic "thumps"	Early indicator of community acceptance and effectiveness of engagement efforts
Completion rate of supersonic hazard identification reviews	**Leading**	% of scheduled supersonic hazard identification sessions completed on time	Demonstrates proactive risk management activity
Safety culture survey scores related to new aircraft operations	**Leading**	Average score from targeted safety culture surveys on supersonic readiness	Measures organizational preparedness and just culture strength
Number of near-miss or incident reports involving supersonic aircraft	**Lagging**	Total reports (with severity classification) involving supersonic aircraft operations	Tracks actual safety outcomes and emerging risk patterns
Runway or ramp incidents related to supersonic ground operations	**Lagging**	Number and rate of runway incursions, excursions, or ramp incidents involving supersonic aircraft	Monitors operational safety performance during ground phases
Regulatory non-compliance findings during supersonic audits	**Lagging**	Number of findings from internal or external SMS audits related to supersonic procedures	Indicates gaps in Safety Assurance and regulatory alignment
Community complaint resolution rate	**Lagging**	% of sonic boom-related complaints resolved within established timeframe	Measures effectiveness of Safety Promotion and stakeholder communication

ANSPs, and manufacturers, supported by robust change management protocols within the SMS. By strategically leveraging emerging technologies while addressing integration gaps, airports can position themselves to safely accommodate supersonic operations and realize the associated transportation benefits.

References

Adjekum, D. K. (2014). *Safety management systems in aviation operations in the United States: Is the return on investment worth the cost?* International Journal of Aviation, Aeronautics, and Aerospace, 1(3), Article 3.

Bonavolontà, G., Lawson, C., & Riaz, A. (2023). *Review of sonic boom prediction and reduction methods for next generation of supersonic aircraft.* Aerospace, 10(11), Article 917. https://doi.org/10.3390/aerospace10110917

Federal Aviation Administration. (2023). *Airport safety management system (Final rule, 14 CFR Part 139)*. Federal Register. https://www.federalregister.gov/documents/2023/02/23/2023-03597/airport-safety-management-system

Fidell, S., & Horonjeff, R. D. (2019*). Field evaluation of sampling, interviewing, and flight tracking of NASA's low boom flight demonstrator aircraft.* Proceedings of Meetings on Acoustics, 36, Article 040002. https://doi.org/10.1121/2.0001265

International Civil Aviation Organization. (2016). Annex 19: Safety management (2nd ed.). https://www.icao.int/safety/SafetyManagement/Pages/default.aspx

Loubeau, A., & Page, J. (2018). *Human perception of sonic booms from supersonic aircraft.* Acoustics Today, 14(2), 23–30. https://acousticstoday.org/human-perception-sonic-booms-supersonic-aircraft-alexandra-loubeau-juliet-page/

Malakis, S., Kontogiannis, T., & Smoker, A. (2023). *A pragmatic approach to the limitations of safety management systems in aviation.* Safety Science, 162, Article 106157.

National Academies of Sciences, Engineering, and Medicine. (2009). *Safety management systems for airports, Volume 2: Guidebook (ACRP Report 1)*. The National Academies Press. https://doi.org/10.17226/14316

National Aeronautics and Space Administration. (2026). *NASA's X-59 flight tests pick up speed.* NASA Quesst Mission. https://www.nasa.gov/blogs/quesst/2026/05/08/nasas-x-59-flight-tests-pick-up-speed-with-two-flight-days/

Nehls, T. (2026, March 24). House passes Nehls' bill to allow supersonic flight over the United States [Press release]. Office of Congressman Troy Nehls. http://nehls.house.gov/media/press-releases/house-passes-nehls-bill-allow-supersonic-flight-over-united-states

Sparrow, V. W., et al. (2019). Sonic boom: Six decades of research. National Technical Information Service.

Stroeve, S., et al. (2022). *Assessing and advancing safety management in aviation.* Safety, 8(2), Article 20. https://doi.org/10.3390/safety8020020

Transportation Research Board. (2009*). Safety management systems for airports, Volume 2: Guidebook*. Airport Cooperative Research Program.

U.S. Department of Transportation, Federal Aviation Administration. (n.d.). *Safety management system (SMS)*. https://www.faa.gov/about/initiatives/sms

Appendix

SMS Gap Analysis Template for Supersonic Integration

This template provides a structured framework for airports and Air Navigation Service Providers (ANSPs) to evaluate their current Safety Management System (SMS) readiness for the integration of supersonic aircraft operations. It aligns each of the four SMS pillars with key supersonic-specific challenges and supports the development of targeted mitigation strategies.

Table A1. SMS Gap Analysis Template – Supersonic Aircraft Integration

SMS Pillar	Current SMS State	Supersonic-Specific Gaps / Challenges	Recommended Actions	Priority	Responsible Party	Target Completion
Safety Policy		Limited or no policy language addressing supersonic operations, sonic boom management, or high-speed procedures.	Update Safety Policy to explicitly include supersonic aircraft operations and low-boom noise management. Establish leadership accountability.	High	Airport / ANSP Leadership	Month 3
Safety Risk Management		Hazard identification and risk assessment processes not designed for sonic booms, modified flight profiles, or unique ground operations.	Conduct supersonic-specific hazard identification workshops. Develop new risk assessment criteria and matrices.	High	Safety Manager / SMS Team	Month 6
Safety Assurance		Existing monitoring systems do not capture sonic boom impacts or community feedback as safety indicators.	Implement sonic boom and community complaint monitoring systems. Integrate findings into regular SMS performance reviews.	High	Safety Assurance Team	Month 9
Safety Promotion		Limited training and communication regarding supersonic-specific risks for personnel and external stakeholders.	Develop and deliver supersonic operations training. Create community engagement and education programs.	Medium	Training & Communications	Month 12